



STATE OF THE REGIONS 2017-18 PILLARS OF REGIONAL GROWTH

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ISBN: 978-1-876114-20-6 Report released 18 June 2017 – Canberra

Regional indicators and data - more indicators and at LGA level

The full online SOR report available from the ALGA website (alga.asn.au) contains a four page indicator set for each SOR region, selected metropolitan cities, Australia and Northern Australia. A similar set of indicator data is also available at LGA level from National Economics (www.nieir.com.au). Enquiries for LGA level data should be directed to Nick Marinopoulos at National Economics. Phone 03 9488 8444 or email nickm@nieir.com.au.

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STATE OF THE REGIONS 2017-18

PILLARS OF REGIONAL GROWTH

The State of the Regions Reports

The *State of the Regions* (SOR) reports by National Economics are published annually by the Australian Local Government Association (ALGA). The reports are launched at the Regional Cooperation and Development Forum, held in Canberra, in June of each year.

The 2017-18 SOR *Pillars of regional growth* is the twentieth report in the series and is available for purchase in colour from the ALGA website – www.alga.asn.au. Previous issues of the reports can be downloaded from the ALGA website or purchased in print form through ALGA. From mid-2014, early issues of the online report were made available, free of charge.

There are two versions of this year's SOR report. The full report available from the ALGA website is an online publication. A summary report is printed and made available to delegates attending the Regional Forum, the event where the report is launched which immediately precedes ALGA's annual National General Assembly of Australian Local Governments.

Previous reports are:

STATE OF THE REGIONS REPORT 2016-17: SUPPORTING A PROSPEROUS VISITOR ECONOMY

This report examines Local government's role in tourism development. Local government helps to administer many tourist attractions and assists in the presentation of tourism-related events. It also provides much of the basic infrastructure which supports the industry, especially transport infrastructure. The report seeks to better understand the importance and complexity of the visitor economy from a regional perspective - not only the opportunities for income generation, but also the associated problems of seasonal and low-wage employment. The report includes an investigation of the Commonwealth role in local government finance. It also covers regional aspects of education finance and regional differences in the pathways from early childhood to satisfying employment.

Regular features included in the report are updates on the structure of regional incomes, skills and employment, housing and wealth, telecommunications, energy and climate change. The report provides extensive data for 67 regions covering all Australia and also includes a chapter on recent economic trends in the major metropolitan areas of Sydney, Melbourne, Brisbane, Perth and Adelaide.

STATE OF THE REGIONS REPORT 2015-16: INEQUALITY BETWEEN AND WITHIN REGIONS

This report argues that reducing the inequality of income distribution within and between Australian regions will be pivotal to strengthening Australia's economy and bridging the employment fallout from the subsiding mining boom in low income regions. The report identifies a need for policies and investments to be implemented on a region-by-region basis to decrease the existing inequality across Australian regions. The success of programs such as the Regional and Local Community Infrastructure Program in 2008-10 and the current Roads to Recovery Program highlights the value and effectiveness of a direct partnership between the Federal and Local Governments in delivering major outcomes in job-creation and economic stimulation.

STATE OF THE REGIONS REPORT 2014-15: REGIONAL DEVELOPMENT IN A GLOBALISED ECONOMY

This report highlights the trend of a widening gap between regions that have benefited from the mining boom and those that have not and identifies that the national economy is now in transition, that we have entered into the post mining boom construction phase and, together with the impact of the high Australian dollar on many of Australia's manufacturing exporters, this requires growth in other areas of the economy to maintain Australian living standards. In the immediate term this is public and private investment in Infrastructure, and increased exporting activity. Development patterns of the North of Australia are discussed as are the troubling features of rising youth unemployment.

STATE OF THE REGIONS REPORT 2013-14: IT'S TIME TO INNOVATE

The report presents further policy findings that builds on the work commenced by National Economics in last year's 2012-13 Rethinking Regional Development and provides further evidence on why a new national approach to regional development is required and what alternative policy approaches should be considered. The consequences for the Australian economy and its regions post mining boom are considered as are the implications, from a social and economic perspective, of natural disasters and the role of local governments in facing up to these circumstances.

STATE OF THE REGIONS REPORT 2012-13: RETHINKING REGIONAL DEVELOPMENT

The report examines the future of regional development in light of the ongoing impacts of the patchwork economy, ever tightening fiscal budgets at both the national and jurisdictional levels, the darkening economic clouds in the United States of America and Europe. The report considers what changes need to be made to Australia's regional development policies to strengthen regional investment.

STATE OF THE REGIONS REPORT 2011-12: BEYOND THE MINING BOOM

The report critically examines the regional effects of the mining boom from 2005. The report produces a balanced analysis of both the benefits and costs associated with the mining boom and the effect the mining boom is having on other industries, as well as the regional implications as the boom ends. Lessons from Norway are included as a best practice international case study.

STATE OF THE REGIONS REPORT 2010-11: THE HOUSING SHORTAGE AND HOUSING AFFORDABILITY

The report analyses the issues surrounding housing supply. Supply issues lead to pricing pressures and these impacts are described in their regional context. Construction activity across the regions is presented.

STATE OF THE REGIONS REPORT 2008-09: SUPPLEMENTARY REPORT

This report represents a supplement to the 2008-09 Report issued in December 2009.

The supplement complements the original report by noting developments in the issues surrounding climate change and updates the regional income and labour market indicators to 2008-09. There is also an update on the impacts of the GFC.

STATE OF THE REGIONS REPORT 2008-09 AND SUPPLEMENT REPORT: CLIMATE CHANGE AND THE GLOBAL FINANCIAL CRISIS

The report and its later supplement continue to focus on the challenges of climate change, especially given the financial economic crisis engulfing the globe.

STATE OF THE REGIONS REPORT 2007-08: CLIMATE CHANGE

The report focuses on climate change and its implications and impact on Australia's diverse regions.

STATE OF THE REGIONS REPORT 2006-07: THE LANDBOOM

Australia's economic performance over the past decade has been exemplary. Incomes have increased, unemployment has decreased, and the inflation rate has remained low. In addition, nearly all home-owners have received gratifying capital gains. For many, this additional wealth has provided psychological compensation for increased working hours and reduced employment security.

STATE OF THE REGIONS REPORT 2005-06: TELECOMMUNICATIONS

The report's theme is at the very core of the issues that may well shape the economic development opportunities and competitiveness of Australia's regions. The Report explores the case for the use of telecommunications infrastructure, to assist regions improve their performance.

STATE OF THE REGIONS REPORT 2004-05: INFRASTRUCTURE

The report explores the case for the use of infrastructure development to assist regions to improve their performance.

STATE OF THE REGIONS REPORT 2003-04: AGEING, MIGRATION AND POPULATION CHANGE

The report investigates how ageing, migration and population growth impact on the economic potential of regions and the revenue raising capacity of local government.

STATE OF THE REGIONS REPORT 2002-03: REGIONAL ECONOMIC GOVERNANCE

The report discusses the role of regional economic governance and along with the traditional update of the regional performance indicators, the report focuses on governance and the linked issue of growing inequality between regions.

STATE OF THE REGIONS REPORT 2001-02: LEARNING REGIONS

The report looks at jobs and learning regions. The prime concern is how well Australian regions are positioned to capture the economic development and employment benefits from the emergence of the knowledge-based or learning economy.

STATE OF THE REGIONS REPORT 2000-01

The report released in December 2000, puts forward a vision for the future of regional Australia, and practical strategies to enable Australia's regions to attain their economic and social potential, based on a detailed analysis of their current performance and prospects. The regional framework adopted allocates the 632 LGAs into 58 regions, and examines five indicators of change based on population, gross regional product, productivity, employment growth and occupational structure.

STATE OF THE REGIONS REPORT 1999-00

This is the second report released seeking to improve the level of understanding about local economies and their regional performance and prospects. The report presents a regional typology framework based on 57 core metro, dispersed metropolitan regions, production zones, lifestyle, rural and resourced based regions. Section 4 of the report models the likely impact of the implementation of National Competition Policy and estimates the potential impact of the GST on regional Australia.

STATE OF THE REGIONS REPORT 1998-99

The report was prepared for the delegates attending the First Regional Cooperation and Development Forum – Sustaining Futures for our Regions held in Canberra on 8 November 1998. Four elements of innovative regional economic development strategies are examined, as are historic trends over the period 1986 to 1996. The key indicators used are population, employed residents, unemployment, and real incomes and skills formation.

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Preface: The accumulated insights of the *State of the Regions* reports

PART A – Stylised Facts

The objectives of the *State of the Regions* reports (SOR – of which this is the 20th) are to:

- 1. present the latest statistical indicators (for this report to 2016-17) describing how Australian regions are performing;
- 2. analyse trends in equality and inequality between Australian regions;
- 3. make suggestions regarding the policy implications of current Australian regional performance;
- 4. steadily expand the indicators used to measure regional performance;
- 5. describe the reality of regional economics;
- 6. assist local governments to understand their own region and compare performance with other regions; and
- 7. to provide local government with useful planning and policy tools.

The 2017-18 SOR builds on the accumulated knowledge of previous SORs to provide a coherent framework for analysing regional development. The reports also provide a base of accumulated knowledge and insights that can assist with planning and policy development. SOR reports identify each region's economic development issues as well as assessing the effectiveness of policies for removing roadblocks to regional economic development.

In order to understand the forces of divergence and convergence in economic performance, the insights of twenty years of reports can be summarised as a series of 'stylised facts'. These are the strategic findings from twenty years of research for the SOR in relation to the drivers that influence regional development. They describe the most probable effects of the identified drivers. They are tendencies and do not apply to all regions.

Effective regional development policy requires the use of all the "facts" with appropriate weights assigned to each fact/driver. The following list is derived from twenty years of reports.

Stylised Fact One

High-income economies, apart from those with a unique and extensive natural resource base, now depend on sustained innovation as the core driver of long-term economic growth.

This basic fact was obscured during the mining boom. Because the mining industry is both capital and resource intensive, its value added per labour hour is high. During the boom this generated rapid economic growth in regions specialising in iron ore, coal and natural gas – less so for other minerals which did not experience the same high prices.

For a few years Australia entertained a belief that all its 23 million people could share in economic growth based on its unique and extensive mineral resource base. However, the mining boom brought costs as well as benefits. The heaviest costs were associated with the so-called Dutch disease. The high mining-boom exchange rate resulted in the closure of considerable non-resource export and import replacement capacity. As stated in previous SOR reports, if commodity prices stay around

current levels (as may well be the case), by 2020 Australia would probably have been better off without the mining boom.

Whatever the case may be by 2020, the current reality as the mining boom subsides is that Australia will have to return to knowledge and innovation as the foundation of its prosperity. The stylised facts of the SOR reports stick by their priorities pre-2005; hence the re-iterated priority of innovation as a driver of Australia's economic development and as a basic goal of regional development policy.

This Fact introduces Stylised Facts Two to Seventeen. Stylised Facts Eighteen and Nineteen are then added as important elements to be considered in all policies.

Stylised Fact Two

The capacity to innovate depends on knowledge and networks at the regional level. Most highincome countries which have maintained sustained growth have done so because they have established successful knowledge-based regions.

Judging by patent applications, Australia's most intensive knowledge-based regions are its metropolitan centres, though several of its independent cities are shaping up. Most regions are connected to the knowledge economy via a metropolitan city, either as suburbs or as hinterlands.

An important weakness of the northern Australian regions, and hence of the country as a whole, is that they have no readily-accessible metropolitan centre through which they can be linked to the world knowledge economy.

Stylised Fact Three

Successful knowledge-based regions have a high concentration of highly skilled global knowledge workers, such as scientists and engineers. These workers tend to migrate to regions with a wide variety of cultural and lifestyle choices.

The economies of agglomeration operate strongly to raise productivity and incomes in knowledgebased production located in the major metropolitan centres. The productivity benefits arise from human interaction, not only in offices and laboratories but in cafes, shops and educational and recreation venues. These interactions occur most intensively when workplaces and other venues are within walking distance of each other, and preferably also within walking distance of residential options.

This said, not every city centre worker wants, or needs, to live in a city centre high-rise; neither do those who patronise the cultural and entertainment options of city centres need to live on the spot. Commuter transport systems are therefore important but should not detract from the walkability which is the sine qua non of a knowledge-based region. Their capacity should be proportional to the size of the knowledge-hubs which they serve.

Similarly, not all jobs are suited to location in knowledge-based regions. Broad-acre and freightintensive industries are particularly unsuitable. However, many such industries depend on knowledge inputs and contribute most to economic growth when they are connected to knowledgebased regions both by telecommunications and by convenient passenger transport.

Stylised Fact Four

There appears to be no limit to the economies of agglomeration, provided that metropolitan built form facilitates the mutual interaction of the whole metropolitan population.

Productivity and employment have been increasing in metropolitan centres more rapidly than in the suburbs, particularly fringe suburbs. Long commute times to jobs concentrated in the innermetropolitan knowledge-based regions have limited the outward expansion of metropolitan areas; the resulting limited supply of residential land with good job access has joined with increasing demand, influenced by financial and tax factors, to increase metropolitan land prices, particularly towards the centres. This has made metropolitan housing less affordable, which in turn has hindered the exploitation of economies of agglomeration.

Stylised Fact Five

Regions with high-productivity jobs (or with commuter access to high-productivity jobs) have high household incomes and low unemployment rates.

Some regions have high productivity jobs due to a favourable industry mix – capital-intensive industries report high labour productivity almost by definition; industries characterised by refuge self-employment report low labour productivity. High productivity is also generated when resources are efficiently and innovatively used industry by industry, as is characteristic of knowledge-based regions.

In most regions the jobs available are mainly taken by people who live within the region. However, metropolitan centre regions are physically small and depend heavily on inbound commuting for labour supply. This is an established practice and is acceptable if the productivity benefits outweigh the cost and commuting times are reasonable (preferably less than half an hour each way). More contentiously, remote regions are increasingly relying on fly-in fly-out. This is acceptable for temporary job locations but has social costs when extended to workers with families.

A caveat: it should always be remembered that productivity is very difficult to measure in the absence of directly marketed output; this applies both to public services (where current conventions impute low productivity) and to the finance sector (where many services are not paid for directly but are financed from interest rate differentials and current conventions impute high productivity).

Stylised Fact Six

Until such time as the knowledge-economy can be generalised, the young will continue to leave low-income, high-unemployment regions and migrate to high-income, low-unemployment regions.

Young people are attracted to the income-earning, educational, cultural and entertainment opportunities of the metropolitan centres and can more easily adjust to high housing costs than people with family responsibilities. The same is true of some empty-nest seniors. However, people will continue to desire greater housing space as they form families, hence the problems of appropriate investment in commuting infrastructure.

Stylised Fact Seven

Australia's difficulties in adopting the knowledge economy would be eased if knowledge-economy jobs could be decentralised.

A recent OECD study by Ahrend et al. (2014) suggests that a doubling in city size is associated with a productivity increase of between 2 and 5 per cent. National Economics has identified links between urban employment density and productivity and examined the empirical relationship between metropolitan-wide productivity and city size finding productivity gains towards the high end of expectations. In face of these economies of agglomeration it has proved very difficult to spread knowledge-economy employment away from the city centres, though there has been some decentralisation to inner metropolitan suburbs (particularly when they share the walkability of the city centre) and some to regions with attractive lifestyle options. Further decentralisation is likely to be incremental – from metropolitan centres into inner suburbs and into regional capital cities which have already established themselves as outposts of the knowledge economy. It will require infrastructure support, especially investment in telecommunications and transport to build new economic opportunities and resilient intelligent communities.

Stylised Fact Eight

Infrastructure deficiencies make it difficult for low productivity/high unemployment regions to increase productivity.

Relatively low housing costs are an advantage for regions seeking to attach themselves to the knowledge economy, as are lifestyle choices; these assist in attracting knowledge workers. However, such workers must be provided with the means to be productive, by placing themselves at the interface between the local economic base (particularly export industries) and the global economy. This requires investment in telecommunications and transport. It also requires low-key local investment so that every main street becomes an outpost of the knowledge economy. Without the appropriate capital stock installed no long-term economic growth is possible. At the centre of economic development is the mobilisation of both the appropriate quantum and quality of investment to make growth possible.

Stylised Fact Nine

Australia could better exploit the potential of its existing knowledge-economy regions by appropriate infrastructure investments.

The affordability of metropolitan housing could be addressed directly by investment in mass transit to make additional fringe areas available for commuter housing and by investment in local transit to extend pedestrian range and so support the geographic expansion of knowledge-based centres.

It will also be important to support the diffusion of knowledge into hinterland regions, and back from the hinterland regions so that the combination of hinterland and metropolitan know-how generates innovation: telecommunications and transport are again required.

Even if all of Australia's knowledge regions are combined, they are but small compared to the megametropolitan regions of Asia, Europe and North America. Further economies of agglomeration could be achieved if the metropolitan areas were integrated to become a single globally-positioned knowledge economy. This will require a retreat from parochial mindsets, more interaction and more specialisation. Competition between states and regions should be re-focused on competition with the world at large. Yet again this would be facilitated by investment in improved telecommunications and transport. Commonwealth Government leadership is particularly important here.

Stylised Fact Ten

Retirees are leaving high-income, high-cost, low-unemployment regions and migrating to lowincome, low-cost, high unemployment regions.

The flow of older people to retirement regions is encouraged where there are marked differentials in house prices between metropolitan and lifestyle regions. Retirement migration is an important source of income to recipient regions in that it supports construction activity. Such regions have to maintain inflow to keep the construction going, but this is not always possible. The question for them is whether they can turn the attributes which attracted retirees (and the retirees themselves) into greater participation in the knowledge economy.

Stylised Fact Eleven

Low productivity regions are ageing rapidly while high productivity regions are ageing relatively slowly.

In regions where productivity is low because of high retiree populations, many households depend on transfer payments, either social security payments or returns on financial investments, supplemented by government finance of health facilities. A region with a high proportion of retirees accordingly depends on other regions for much of its income. The challenge for such regions is to leverage the liveability which originally attracted retirees into the attraction of knowledge-based businesses.

Regions may also suffer low productivity because they have specialised in declining industries, usually accompanied by a failure to invest. With the current emphasis on short-period returns, downturns can be remarkably rapid. An example is the downturn in industries adversely affected by the high exchange rate due to the mining boom. Much damage can be done, and failure to maintain capacity can result in inability to take advantage of later opportunities.

Stylised Fact Twelve

Australia's capacity to invest for fully-employed participation in the knowledge economy has been curtailed over the past three decades by its accumulation of debt and by failure to prepare for the costs of climate change.

The accumulation of debt by households followed financial deregulation, which gave the banks free rein to lend and reduced the flow of funds to government borrowing for infrastructure finance. Households proved short-sighted and borrowed freely. For the foreseeable future a large proportion of Australian households will be forced to prioritise debt servicing, which will reduce their capacity to respond to opportunities.

The accumulation of debt by Australian households had a counterpart in the accumulation of overseas debt by the banks. The necessity to service this debt will bear down on Australian standards of living until such time as the debt is either repaid or renegotiated.

Debt accumulation had a further counterpart in the accumulation of wealth by a small minority, adding to economic inequality.

Debt servicing costs and the demands of the wealthy minority will limit Australia's capacity to rectify its infrastructure deficiencies at a time when the costs of remedial action are increasing due to climate change.

Since infrastructure by definition requires public provision (either directly or via financial arrangements) the current infrastructure backlog is basically a failure of government investment. The next three decades are likely to see continued debate the role of the three levels of government providing infrastructure and hence on the financing of infrastructure. If user charges cannot fund appropriate provision, there is only one choice: taxes, either now or deferred through loans.

Short time horizons in the financial sector (sometimes characterised as a shortage of patient capital) not only affect infrastructure investment, they also dampen those types of business investment which require long time horizons. In particular, worthwhile investment in agricultural and manufacturing businesses requires time horizons of at least a decade. The current concentration on short-term returns calls into question the wisdom of the free-market reforms of the 1980s. It is likely that future tax debates will be accompanied by questioning of the role of the finance sector.

Stylised Fact Thirteen

Income inequality within and between regions is associated with depressed economic growth.

Economic policy over the past three decades has been founded on the proposition that economies respond to market incentives and that such incentives should accordingly be sharpened. This may be true over short periods but over longer periods of a decade or more there is a cost: the working of the untrammelled market increases inequality of income.

International evidence summarised by the OECD and IMF shows that increases in inequality generate reductions in long-term economic growth rates.

Within Australia, the higher the per-capita disposable income of a region, the higher the growth rate it achieves. This will be partly due to higher per-capita resources available for investment but will also be partly the result of the unequal rewards that result from successful response to incentives.

Once this effect is taken into account, the more unequal the household disposable incomes of a region, the lower is its growth rate. As the OECD suggests, this is likely to reflect inequality of access to educational opportunity but it is also likely to reflect poor access to employment opportunities in regions to which people have resorted to avail themselves of low housing costs, or which they have difficulty in leaving because they are locked in by low housing capital.

In addition, as stylised Fact Seventeen suggests, income inequality between regions can also influence educational attainment in terms of the basic literacy and numerously skills.

Stylised Fact Fourteen

There is increasing inequity in regional economic performance in Australian cities, with fringe urban areas being at an increasing disadvantage.

The greater the distance a sub-region is from the central LGA (of the City of Melbourne or Sydney), the less is productivity compared with the city-centre peak. The historical record shows that growth in Gross Regional Product per hour worked has increased much faster in inner Sydney and Melbourne municipalities than in the fringe municipalities in those cities and the that gap has increased with increasing distance from the centre, suggesting relatively declining access to high productivity employment and, in some cases, declining access to hours of work in outer areas. It is the key reason for increasing inequality.

Stylised Fact Fifteen

Standardising pupil/teacher ratios is a necessary, but not sufficient, condition for education attainment inequalities to be reduced between regions. Another necessary condition is to reduce income inequalities between regions and that requires long term planning.

Unemployment and income inequalities between regions are an important driver of inequality of outcomes in the literacy and numeracy skills of primary school age children.

Stylised Fact Sixteen

Tourism exports are an important driver of economic activity and employment in many regions. However, on a net basis, because of Australia's high expenditure on tourism imports (Australians travelling overseas) and domestic tourism being a zero sum benefit for the national as a whole, the net benefit from tourism for the majority of regions is relatively low.

The central regions of Australia's major metropolitan cities are generally the major net beneficiaries from tourism. These are regions which are also currently performing well economically. Elsewhere local councils are in a position to improve their net benefits from tourism, both by encouraging inbound tourism and by encouraging residents to spend locally instead of in other regions or overseas. Though regions can generate export income from tourism, labour productivity in the industry is low and high incomes should not be expected. However, local investments which improve visitor experience frequently benefit local residents as well and indeed, by improving liveability, can be helpful in attracting knowledge-economy residents and businesses.

Stylised Fact Seventeen

It follows from the above that there is no market driven tendency for inequalities in economic performance between regions to be reduced. High-technology innovation-driven development means that regions which established competitive advantages in these activities can increase their relative performance in terms of high incomes and low unemployment rates without "technical" limits. This is because scale is important and Australia's high-technology knowledge-based regions are small by world best practice.

The only practical constraint to metropolitan growth is that high dwelling costs will choke off the supply of labour, limiting the economic potential of these regions and therefore the nation. This was the experience of the Sydney metropolitan area from 2001 to 2008. A repeat experience threatens, in which metropolitan growth will slow down due to high housing and commuting costs.

Stylised Fact Eighteen

Since market mechanisms will not reduce inequality of economic performance between regions, public policy has a key role in reducing inequality of economic performance between regions and by so doing maximising overall economic growth of the nation.

The role of policy in promoting economic growth is to maximise the quantum of infrastructure capital including investments in transport, communication, health, education, etc. and organising its distribution with multiple aims, including reducing the obstacles to growth in Australia's current high-technology regions and laying the foundations for the development of new, successful knowledge-intensive regions, all in the context of promoting environmental sustainability and governing

Australia's trade and capital-flow relationships with the rest of the world so that they remain financially sustainable.

Public policy also has a key role to play, either directly and or indirectly, for example by infrastructure planning to influence housing affordability and facilitate the increase in population densities necessary to sustain the growth of high-technology knowledge-based regions.

Public policy also has a key role to play in reducing the inequality within regions by appropriate tax and income transfer policies.

PART B – The empirical rules supporting the stylised facts

The empirical support for the above stylised facts can be grouped into six general rules based on empirical observation of interregional performance. Each rule has a number of sub-rules or corollaries.

The empirical evidence for the rules, as would be expected, is particularly sharp at the LGA or even the smaller SA2 levels. Nevertheless, the SOR region data is satisfactory in showing the general empirical support for the rules.

- **1.1** Rule one:At any point in time there is substantial inequality in economic
performance between Australian regions. Given initial inequalities,
there are at best only weak market-driven economic forces tending
towards convergence between regions in economic performance.
- 1.2 Corollary to Rule one: Market forces tend to perpetuate inequalities in work-derived income. If market forces generate inequality of performance between regions, over time there will be inter-regional conflict over tax and income transfers with poor people seeking greater transfers and the rich resisting. Politically a more effective mechanism would be to influence market forces by general government regional development policies to ensure greater equality in the growth of pre-tax incomes.
- **1.3 The context:** Regional development policy has not, over recent decades, been at the forefront of the national economic development policy agenda. An underling intellectual reason for this is the major role of so-called 'general equilibrium' models in the training of national policy advisers. These models assume that market forces will ensure convergence in economic performance between regions, arguing that investment will be reallocated from regions with high unit costs to regions with low unit costs. As will be seen below this assumption is empirically empty.

1.4	The evidence for Rule one:	Across the 67 regions of this report, there is considerable variation in GRP per hour worked. In 2016 the range was from \$_{CVM}57 per hour worked to \$_{CVM}207, with the Pilbara-Kimberley region an outlier at \$_{CVM}356 per hour. The ratio between lowest and highest in 2016, in terms of productivity, is, therefore, over 6 to 1.
		In general, the relative position, in terms of productivity, in 2016 reflects its position in 2000. In 2016 the difference in remuneration in dollars per hour of income worked within each region ranged from c_{CVM} to c_{CVM} and c_{CVM} . The lowest was for the Qld Wide Bay Burnett region. The simple rule, from regression fitted to the regional data, is that if income per hour was x in 2000, income per hour in the same region in 2016 will be 1.26 times x. The data also show zero relationship between the level of productivity in 2000 and the growth in remuneration/productivity over the next 16 years.
1.5	Evidence for corollary to Rule one:	If we refocus from earned incomes to household disposable incomes by subtracting income taxes and adding benefits there is evidence of reduction in relative inequality across SOR regions between 2000 and 2016. This evidence consists of a negative relationship between the year 2000 level per capita disposable income and the subsequent percentage change to 2016. However the tax and income redistribution measures were not strong enough to stop inequalities widening in terms of the level of per capita disposable income. Accordingly, the change in per capita income from 2000 to 2016 is positively related to the scale of the initial per capital income in 2000. The relationship as quantified by regression is that the change in per capita disposable income from 2000 to 2016 will be on average one third of the initial level.
2.1	Rule two:	In regions other than mining-based regions the proximate reasons for regional inequality, in terms of productivity and hours of work available, are:
		(i) the scale;
		(ii) the intensity of high technology industry production;
		(iii) the concentration of global knowledge workers; and
		(iv) the availability of community services and lifestyle services.
2.2	The context:	Rule two explains why, in 2016, some regions reported GRP per hour worked, of ς_{CVM} 50 while others (ignoring the mining-based regions) reported productivity of near ς_{CVM} 90 per hour worked.
2.3	What are high technology industries?	High technology industries produce goods and services that require highly skilled labour input and/or a high capital intensity of production. Such industries include mineral exploration and mining services, transport and machinery production, publishing, broadcasting and Internet services, information services, finance, computer and digital technology services, tertiary education, hospital services, the arts, legal and accounting services.

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 State of the Regions Report 2017-18 made possible with the assistance of Jardine Lloyd Thompson
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- 2.4 What are global knowledge services? Global knowledge workers are identified by their occupation. The occupations defined as global knowledge occupations include advertising, corporate services, finance, policy and ICT managers, artistic directors, producers, performers, authors, senior film personnel, writers, acoustics, senior finance personnel, technology development personnel, economists, information providers, fashion and graphic designers, engineers, chemists, geologists, medical scientists, general scientists, legal professionals, etc.
- 2.5 The evidence for Rule two: Comparing Australian regions, there is empirical evidence that productivity rises with metropolitan size and is positively related to high-technology industry intensity and the intensity of global knowledge workers. Further, there is a positive relationship between global knowledge worker intensity and the intensity of community and lifestyle services. Liveability characteristics can accordingly be an important driver of economic development if they induce global knowledge works to settle in a region which then encourages enterprises to invest in the region to capitalise on the available skilled labour.

Of course, the reverse causation can also apply.

- **3.1 Rule three:** The enabling condition for Rule two is the presence of adequate physical capital stock.
- **3.2** Corollary to Rule three: Only part of the capital stock installed is driven by market forces. Investment in transport, communications, education, health and other knowledge-creation infrastructure is at the discretion of the policy authorities. Policy can have a substantial impact on the economic performance of a region by influencing the size of the national capital stock and determining where the governmentadministered part of the stock is installed and at what level.
- **3.3 The context:** Capital stock covers physical assets in transport and communications plus community capital stock, such as education and health facilities and commercial capital stock such as mines, factories and commercial buildings.
- 3.4 The evidence for Rule three: In 2016 there was a close correlation between construction capital stock installed by region and headline GRP. In general, for each \$1 of capital stock installed \$1 of annual headline GRP was produced. In terms of increments, for each \$1 of additional construction capital stock secured by a region between 2000 and 2016 the increase in annual headline GRP was \$0.8. Further, the greater the construction capital stock installed per capita of the working age population, the greater the density of high technology industry activity. Empirically, for each \$100,000 per capita of capital stock installed, the share of high technology production in value added increases by 0.12 per cent.

- **3.5 General comment:** The installation of high levels of capital stock, both in absolute and per capita terms, is a necessary condition in non-mining regions for high technology industry intensity, high global knowledge worker occupation intensity and plentiful availability of lifestyle and community services.
- 4.1 Rule four: The tendency for inequality to be sustained between regions arises because strong initial proximate drivers for inequality generate continuing strength in these drivers. This holds for all the proximate drivers of inequality of economic performance between regions, namely:
 - (i) scale;
 - (ii) high technology industry intensity;
 - (iii) global knowledge worker intensity; and
 - (iv) lifestyle and community services.
- 4.2 Corollary to Rule four: A further key factor explaining why inequality remains entrenched in the link between economic performance and educational attainment of children. This is because many studies have shown that, once teacher-pupil ratios have been standardised, the home environment is a key factor in explaining a child's educational attainment. Low household income and low educational attainment of parents are not conducive to a child's rapid achievement of basic literacy and numeracy skills.
- **4.3 The context:** The better the indicators in an initial year or base year the greater will be the improvement in the indicators, in absolute terms, at least over the period commencing with the initial year.
- 4.4 The evidence for Rule four: It has been established that a region's scale is a positive driver of productivity. Empirically, given the productivity in the initial year, productivity will be 1.26 times higher after 16 years. This is true not only for non-mining productivity in general, it is also true for high technology industry activity, global knowledge worker share of employment and community services and entertainment hours per capita. For each of these, whatever the initial conditions, the year 16 indicator outcomes will be greater.
- **4.5 General comment:** Given the initial conditions, the expectation from the data is that market forces will, at best, lock in existing inequalities and will most likely exacerbate them. The empirical evidence indicates that policy decisions on the allocation of public capital stock have not favoured the low-income regions sufficiently to offset market forces. They have failed move towards equality of economic opportunity between regions.

5.1	Rule five:	The lower the unemployment rate in a region and the higher its level
		of productivity, the greater will be the immigration of the young,
		with the retirement generation tending to migrate in the opposite
		direction. Thanks to ageing in situ coupled with retirement
		migration the population increase for the older age group is highest
		in high-unemployment low-productivity regions.

- **5.2 The context:** Rule five adds to the explanation of why inequalities between regions have been entrenched and are likely to increase.
- 5.3 The evidence for Rule five: Low unemployment results in high jobholding rates as measured by hours worked per capita of the working age population. Combined, the jobholding rate and productivity (measured in dollars per hour worked) yield the total income from work per capita of working age population. This can be used to represent both the unemployment and productivity indicators.

Empirically there is a positive relationship between income and the share of population aged 20 to 29, and there is a negative relationship between per capita income from work and the share of the population aged 55 and over.

5.4 General comment: The dynamic driving this relationship lies in housing costs. The higher the productivity of a region the higher its real incomes and the higher its housing costs and the capital gain if dwellings are sold. This encourages/forces low-to-medium income older age households to migrate from the region.

The young, or at least the best qualified young, migrate to the regions with the highest paying employment opportunities and the most attractive tertiary education institutions.

- 6.1 Rule six: For long-run positive population growth the housing stock must be expanded to accommodate the population. To do this two conditions are required:
 - (i) The cost of new dwelling construction must not be significantly above the market price of established dwellings. If this is not so, those who undertake the construction of new dwellings are at risk of substantial capital loss especially in the short-term. and
 - (ii) The mortgage service costs on new dwelling construction must be affordable, in terms of the income that an average household can generate from the labour market catchment of the region.

6.2 The evidence for Empirically, where the ratio of new dwelling cost to established Rule six: dwelling prices and recent housing activity is near or below one, dwelling construction activity increases substantially. At above one, dwelling construction is reduced simply to the replacement rate of approximately 2 per cent a year. In these regions population growth cannot be sustained. The problem for the sustainability of Australia's successful growth regions arises because established dwelling prices tend to increase rapidly when real per capita income from work increase. Once a ratio of 6 to 9 times household income is reached, mortgage costs will not be affordable in relation to terms of income from work. Once this ratio is reached, apartments become the only affordable type of dwelling. As a result, the sustainability of Australia's leading hightechnology knowledge-intensive regions, in terms of housing affordability, will depend on the willingness of households to adapt to high density living. This raises the further question as to whether the apartments currently being built are of suitable design and quality to encourage this transition? On this will depend as to whether or not the current growth potential of Sydney and

Note: graphs of the empirical relationships which support this list of rules will be found in the equivalent section of the full version of the State of the Regions report for 2016-17.

Melbourne is achieved.

Executive summary – Pillars of regional growth

There is much to applaud in the Productivity Commission's recent commendation of regional planning; planning which focuses on each region's relative strengths as locally perceived. This commendation is important in two ways. First, contrary to recent fashion it concedes that there is a role for regional planning; it is not wise to leave economic development simply to market forces. Second, it emphasises the importance of local knowledge in the preparation and implementation of economic development strategies.

If regional economic planning is to be authoritative and effective, it requires government auspices, not only to ensure that different voices are heard and balanced in a democratic way, but to provide the impetus to ensure implementation. In Australia authority is shared between federal, state and local government, and there is a strong case that the authority of each should be shared in the preparation and implementation of regional plans. The levels of government are able to bring complementary strengths to the process of planning.

- The Commonwealth, primarily because it has charge of Australia's overall economic strategy as a nation which trades internationally, and also because it administers the national finances (both revenue raising and the broad outlines of expenditure) and is responsible for the regulation of the finance sector. In coming to the table, the Commonwealth should also acknowledge its weaknesses, which primarily have to do with lack of local knowledge and enthusiasm for one-size-fits-all strategies.
- The states and territories, primarily because they are responsible for strategy at the megaregional level but also because they administer the major public services and much infrastructure provision. The states and territories also have weaknesses, most commonly identified as their silo tendencies; their concentration on the efficient but uncoordinated delivery of particular services.
- Local governments, primarily because of their local knowledge and ability to see the regional scene as a whole, but also because of their local administrative capacity and planning powers. Involvement with the Commonwealth and the states can raise the sights of local governments above the parochial level, as can involvement with neighbouring councils. (Some LGAs constitute coherent wholes for strategic planning purposes, but in many parts of the country regional associations of councils are more appropriate.)

In its initial report entitled *Transitioning Regional Economies* the Productivity Commission stops short of suggesting how these strengths should be combined to offset their corresponding weaknesses, but its report implies a split between three different functions, as follows.

- Planning and strategy development.
- The allocation of funds to the implementation of plans, whether on a project or ongoing service basis.
- The actual implementation.

In this *State of the Regions* report we concentrate on the first of these duties, plan preparation, as it should be undertaken at the regional level. We assume that all three levels of government will be associated in planning for each region, perhaps through the existing Regional Development Australia structure or through some variant of it, not necessarily the same for all regions.

We begin with the observation that the sine qua non of income growth is growth in productivity and particularly in growth in output per hour worked. Chapter 1 of the report discusses recent Australian productivity growth rates in the context of policies implemented largely at the federal and state

levels and makes several observations. In the quarter-century to 2016 productivity grew more rapidly than it had in the 1970s, though growth tailed off after the Global Financial Crisis. Of this growth, the portion which matters at the regional level is that captured by local people in the form of wages and the mixed wage/profit incomes of locally-owned business – growth which goes into corporate profits finds its way to head office, where it is pooled and distributed nationally and internationally.

Nationally, over the quarter century, local income per hour worked increased at 2.2 per cent a year. The finance sector was the only group of industries to beat the national average, with a growth rate in productivity so measured of 3.7 per cent a year, way above the public service where the rate of increase was below national average at 1.9 per cent a year. Trade-exposed industries, including agriculture, mining and manufacturing (all of which export and/or compete with imports) also increased productivity by 1.9 per cent a year. Productivity growth was even lower in a group of highly-competitive, labour-intensive industries centring on hospitality and retail, which, apart from sales to international tourists, do not export and are not exposed to import competition; in these industries productivity increased at 1.5 per cent a year. The remaining industries, those which are not much exposed to international competition but where there are barriers to entry, such as economies of scale or professional qualifications, recorded increases in productivity at the national average rate of 2.2 per cent a year.

These estimates raise important questions.

- Does the rapid growth of real income per hour worked in the finance sector reflect a genuine increase of productivity, or is it due to something else, such as excessive sales of debt to households? Has the sector been imprudently inveigling people into debt? Two NIEIR authors, Peter Brain and Ian Manning, address these questions in a book entitled *Credit Code Red*, which is shortly to be published by Scribe, Melbourne. Because NIEIR's views on this topic will soon be available in detail, it is not further considered in this report.
- Over the past three decades we have heard a great deal about the importance of competition as a driver of growth. Why, therefore, has the productivity growth rate been so low in the most competitive industries? For that matter, why do these industries yield such low incomes?
- Thanks to the low rate of growth of earnings per hour in the most competitive industries, which happen to be major employers, and the high rate of growth in finance (and in executive salaries), inequality of earned income has been rising. This raises serious questions for national cohesion, not to speak of the question as to whether human resources are being used to best advantage.
- Finally, and of considerable concern, the slow rate of growth of productivity in the tradeexposed industries reflects the difficulty that Australia is having in making its way in a highlycompetitive world. The counterpart of low returns in the trade-exposed industries is a shortage of exports and an excess of imports, financed by heavy overseas borrowing. This borrowing has largely been the work of the finance sector, and like the increase in household debt is analysed in *Credit Code Red*. Suffice here to say that Australia is increasingly at the mercy of its creditors. Preferably sooner than later, it will be imperative to improve the relative position of the trade-exposed industries.

Behind these questions lurks a more fundamental observation, which is that the weaknesses of the Australian economy result from the experiment of relying on markets and the financial sector to guide economic growth. It was a novel experiment; as the prologue to Chapter 1 points out, up until the 1980s Australian governments were all directly involved in the government of trade. It will be necessary for them to resume this responsibility if they are to counter the weaknesses exposed over the past quarter century of reliance on finance sector decisions. In this context, Chapter 1 reviews the Productivity Commission's initial report on *Transitioning Regional Economies*. Regional planning will certainly be part of the resumption of government responsibility for overall economic strategy.

Chapter 1 ends with what is essentially an appendix, a re-assessment of the classification of regions which is used descriptively in the rest of the report.

Chapter 2 takes a traditional economist's supply/demand approach to the factors which should be taken into account in preparing regional plans. The first half of the chapter concentrates on the supply side by considering four pillars of productivity.

- In any region, economic growth depends on the regional skill base. Regional plans should cover the skills available in the region and the means by which they may be augmented, including local education, the attraction of migrants from other regions and overseas, the retention of local skilled residents who are tempted to migrate out, and (in metropolitan regions particularly) improvements to transport to enlarge the commuter catchment. Many of these areas are addressed by policies at the three levels of government, with scope for integration into regional strategies.
- Again rather obviously, in any region economic growth depends on the stock of appropriate non-dwelling physical capital. Much of this is privately-owned and industry-specific but the infrastructure which undergirds all the industries of a region is also important. Traditional economic development planning, as practised in Australia since colonial times, has long experience with this and there is every reason to adapt this experience to 21st Century technologies. Regional plans can be drawn up with an eye to implementation by direct government investment, including local government investment, and also, where appropriate, to take advantage of public-private partnerships and (more controversially, but with ample precedent) to attract or even direct private funds into investments which will benefit the region.
- Knowledge-creation capacity has risen in prominence over recent decades. It is distinct from skills and physical capital and underlies the potential for innovation. It is strongly networked, both locally and overseas, and requires a density of interaction which has so far seen it developing mainly in metropolitan areas, though there can be outliers to places where people of ideas find it congenial to live. Regional planning can at best address this pillar indirectly, as through ensuring the supply of services such as quality education which are appreciated by knowledge-industry workers.
- Finally, supply chain strength emphasises the links of trust, habit and perceptions of value that underlie trade. The more varied the links, and the more intimate, the stronger the position of the region. As with knowledge-creation capacity, governments can foster links indirectly by encouraging interpersonal contact; they can also be pro-active through such items as backup support for new exporters and support for regional marketing.

The chapter uses these factors to construct an assessment of potential productivity growth, region by region for the quarter century to 2016, and compares this potential with actual performance. Though productivity growth in a few regions was close to potential, most regions fell short. In particular, performance was significantly below potential in three types of region.

- In manufacturing-oriented commuter suburbs and independent cities, the failure to achieve potential was in line with the poor performance of trade-exposed industry. In these suburbs and cities relatively high-productivity employment in manufacturing was replaced by low-productivity employment in services, though there are recent signs of recovery in some regions. As government attention turns towards the health of trade-exposed industry there should be increasing opportunities for smart planning in these regions.
- Most of the agriculture-based regions failed to achieve potential, again as part of the general poor performance of the trade-exposed industries. Thanks to their location far from the centres of the knowledge economy, it has been difficult to realise potential in these regions, and the only effective development policies will aim to utilise the available resources and add

complementary new resources to improve productivity performance. A workable strategy for each region is likely to be highly region-specific and be based on a combination of local knowledge of resources available with broader knowledge of possible markets.

Performance has also fallen short in lifestyle regions, due to their orientation to low-productivity service industries. The main export industry of many of these regions, tourism, is a low-productivity industry, good at generating jobs but not so good at generating income. Some lifestyle regions are beginning to parley their lifestyle advantages into knowledge-economy advantages, but this is a slow and difficult process.

A major reason for regional failure to attain potential growth in productivity has been lack of demand for the traditional exports of the region. It is arguable that insufficiency of demand is an important factor at the world scale, but the shortcomings of the world economy cannot be addressed at regional scale; regions instead face the challenge of fitting into a world economy which is beyond their control.

Despite the evidence that lack of demand is a factor limiting economic growth, the conventional wisdom over the past three decades or so has been that supply creates its own demand so that an increase in productivity not only increases the output that can be produced with a given labour force but increases sales so that employment is maintained and output increases. In this case, all concerned will be better off. The problem is that increases in productive capacity do not automatically generate increases in sales.

The second half of Chapter 2 looks at this process in more detail. An increase in productivity allows employers to produce the same outputs with less labour and hence to reduce hours worked. If hours worked are to be pumped back up to the original level, it will be necessary to expand demand, either in the industry in which productivity has increased or in other industries to which labour can be transferred. The problem is that demand expansion within the region inevitably leads to increased imports, which are almost certain to curtail the demand expansion short of the level required to ensure constant utilisation of capacity. In other words, unless productivity improvement at regional level is accompanied by increases in exports it will threaten employment. It may also lead to the transfer of workers to low-productivity jobs in industries like hospitality and retail, the sort of shift that has been observed over the past quarter century.

This process been taking place at the national level and in similar countries overseas, with political results which are increasingly uncomfortable for the reigning elites. It can also be observed among Australia's regions. Metropolitan core regions have been gaining increases in productivity from their knowledge-based industries, including somewhat dubiously from finance, and have raised their exports of the services of these industries. Meanwhile, with the temporary exception of regions producing minerals with booming prices, regions distant from the metropolitan centres have suffered significant declines in their relative real incomes. Productivity has increased, but so has the intensity of overseas competition; exports have not risen to maintain employment and imports from the metropolitan centres have risen. As already noted, the trade-exposed manufacturing suburbs and independent cities have been unable to raise average productivity except patchily. These trends are increasing regional income differentials and raising the potential for political instability.

The only long-term solution will be to supercharge the pillars of productivity growth in regions which are currently at a disadvantage, concentrating on export incomes. To do this, resources will have to be mobilised, in the first instance by governments and then by the private sector leveraging off the initial government investments. To put it bluntly, this will require an increase in tax rates, to divert some of the income gains of the core metropolitan regions to investment in the drivers of productivity growth in the outlying regions, including the fostering of demand for their products (which will to some extent happen naturally as Commonwealth policy switches from leaving the balance of overseas trade to the market to a more traditional policy of subtle export promotion).

Chapter 3 of this report highlights the regional pattern of export earnings. From a regional point of view international and interregional exports contribute equally to prosperity, but from a national point of view Australia's current need (as a country running a balance of trade deficit) is an increase in overseas exports and/or a decrease in imports from overseas. However, the difference between international and interregional exports may be more apparent than real, in that many interregional exports are of import-competing goods and services. We argue that regional development strategies must be founded on a realistic assessment of the region's economic base in its international and interregional export industries.

Chapter 4 turns attention to other ways in which regions can garner income for their residents. By definition, in commuter suburbs (and in the source regions for FIFO employment) a significant proportion of resident income derives from work done in other regions, especially the metropolitan core regions. This raises a choice: should investment concentrate on improving connectivity with the metropolitan core, or should it concentrate on local job generation? This involves difficult questions of judgement as to the extent to which knowledge-economy work can be decentralised within metropolitan areas without losing it to other cities in Australia or overseas, versus the returns to faster commuting. The chapter also covers redistribution of income via property income and the extent to which regions rely on social security benefits.

The remaining chapters provide updates on aspects of regional development.

Employment and unemployment

Chapter 5 analyses some of the risks to future employment, particularly in the retail and manufacturing sectors, and provides an update on regional unemployment.

Debate about future employment in Australia has focussed on the impact of automation and digitisation on employment, not only in terms of skills, but also in terms of job losses, because labour productivity is increased by these processes. In this world lies both opportunity and uncertainty as well as the possibility of increasing inequality between and within regions. Amid the uncertainty, industry sectors are changing as technology redefines markets and company structures. As an example, higher levels of automation in advanced manufacturing, in farming and in the mining industry are reducing labour demand and changing the types of skills employed. The Internet is central to these changes and poor standards of connectivity will constrain productivity improvements and entrepreneurships in many industries.

Clusters of industry types are immensely important in developing a contemporary economic system because high value adding businesses require a greater intensification of knowledge. So co-location of industry types is likely to be more important than ever before. Industry clusters are likely to stimulate a greater capacity for the industry to develop higher levels of skills as employees move from one company to another and network in industry groups. These clusters provide education and training organisations the critical mass to deliver education and training for the industry.

The retail sector is important, and important to regional Australia, in that it provides local employment as well as employment for young people, often as a first job, so the retail sector assists young people in learning job ready skills. Productivity improvements in the retail sector will come about through improving professional standards through professional development strategies, innovative management practices and higher skilled and more knowledgeable employees. ICT and STEM skills generally play an important role here.

While at least some of Australia's major retailers were slow to react to the opportunities and threats from online retailing, this is changing. There has, however, been a significant penetration of online sales, clothing is just one example, into the Australian market from firms with little or no physical

presence in Australia. The most successful online retail operations, and fast and effective distribution is essential, are large Australian retailers, international firms selling their products into Australia, international firms such as Amazon and Alibaba who plan an expanding local presence, and a cohort of locally developed businesses, including entrepreneurial start-ups, often without a previous track record in the bricks and mortar retail sector. The question for local government then becomes how vulnerable does this make the smaller retailers who lack the interest to engage in the web-based economy?

The trend for the manufacturing sector in Australia is towards advanced manufacturing, which is a knowledge intensive industry, and this includes relatively low run bespoke manufacturing. The impact of the loss of the automotive manufacturing industry is not fully played-out as manufacturing closures and restructuring are likely to continue for some time, including further impacts in Melbourne. A long-term consequence from the loss of the automotive manufacturing industry will be the loss of access to these global manufacturing skills and the knowledge diffusion to other industries that has been such a strong feature of automotive manufacturing and a contribution to economic development. The consequential hollowing out of supply chains is likely to create a problem for existing industry and be a barrier to new manufacturing opportunities.

In the advanced manufacturing industry the impact of digital technologies is significant. The structure of the industry is also changing with the blending of occupations and changes to the relationships with customers and supply chain companies. These changes include the blending of traditional processes of design, engineering, planning, manufacturing with for example, marketing and distribution and ownership intellectual property rights. Research and development and intellectual property rights are an important foundation of this industry.

To be successful, the development of an advanced manufacturing industry requires strong links with universities and this research and development expertise. Innovation, collaboration and industry clusters are very important in the development of this industry.

NIEIR unemployment

By January 2016 more than 50 per cent of 15 to 24 year olds were engaged in full-time education. Meanwhile, 11 per cent of this cohort were neither participating in full-time education or employment. The disengaged young remain a major concern, as does inequality of employment outcomes between regions.

In 2017 the ten regions with the highest headline unemployment rate for 15 to 24 year olds have an average unemployment rate of 20 per cent against a national average unemployment rate for this cohort of 13.1 per cent. This compares to average unemployment rate in the most disadvantaged regions in 2016 of 17.8 per cent against a national average unemployment rate for this cohort of 12.6 per cent. The range of the ten highest unemployment regions for this group of young people in 2017 is between 17.3 per cent (Melbourne City) and 25.1 per cent (NSW South Coast). This compares to a range of between 16.4 per cent (NSW Northern Inland) and 25.9 per cent (QLD Far North Torres) in 2016. The ten best performing regions had an average unemployment rate for the 15 to 24 year-old age group of 7.4 per cent when compared to a national average of 13.1 per cent.

For the general working age population in 2017, QLD Wide Bay Burnett remains as the region with the nation's highest NIEIR unemployment rate, at 16.7 per cent, slightly down from 17.1 per cent in 2016, followed by Qld Far North Torres at 14.2 per cent, again slightly lower than last year's result of 14.8 per cent and NSW South Coast at 14.1 per cent. These regions continue to be beset by chronic problems such as low skilled, non-job ready and unqualified residents and lack of employment opportunities, or one or more of these in combination, resulting in a significant shift from
unemployment benefits to disability pensions. In 2017 Melbourne City has the lowest NIEIR Unemployment rate at 3.7 per cent.

Smart cities, intelligent communities and beyond

Chapter 6 of the report expands the intelligent community narrative. The term smart cities is often aligned to the deployment of smart technology such as Internet of Things (IoT) devices such as sensors to improve efficiency, leading to improvements in overall liveability. Real-time traffic management, real-time energy consumption management, integrated public transport networks and data collecting sensors are examples of smart technology contributing to the efficiency of a modern city. These technology based networks generate large volumes of data which is analysed and leveraged in real-time decision making. We propose to expand the "intelligent community" narrative by incorporating the technology aspects of a smart city, with parallel investment in social capital and liveability factors contributing to better outcomes through a virtuous circle effect. An intelligent community leverages data for business insight leading to innovation which is business and people driven rather than technology led.

The challenge for many communities is the lack of capacity and capability to derive value from data assets for innovation to occur. Higher levels of governance can generate value for all communities through investment in common platforms for hosting open data. This would empower communities to leverage publicly accessible data assets to derive business insight needed to enable community initiated innovation.

Cyber security

Chapter 7 provides a warning about the risks and cyber-related incidents and attacks that have come to dominate news headlines, and for good reason. Digital platforms are growing exponentially from desktop through to portable devices, and software companies are also driving the storage of information to the Cloud. This proliferation of data and technology, together with the increasing sophistication of targeted cyber-attacks and the potential for human error, mean that the likelihood of a cyber-related incident affecting an organisation's systems, data and reputation is perhaps now greater than ever.

Housing and construction

Chapter 8 discusses the updated estimates for housing and construction. The analysis of household wealth demonstrates inequality between regions. The lowest wealth regions may lack the capacity to deal with change or improve productivity as industry and skills requirements change as a result of global influences. In regions where this is not the case, other reasons for the relative decline of household wealth typically include slow land value increases relative to elsewhere and/or high mortgages relative to property values. The rise in the number of apartments in inner cities also has an impact on reducing average household wealth as a consequence of smaller dwellings and the smaller number of occupants per household that result. The value of CBD and inner city knowledge economy clusters also has an impact on the distribution of household wealth. Local Government area boundary changes in New South Wales have also had an impact on the household wealth in Sydney given in SOR regions in this report.

The SOR region with the highest average wealth per household in 2017 is Sydney Outer Northern Shores at \$1.95 million, increasing from \$1.77 million in 2016. The region with the lowest average wealth per household in 2017 is WA Gascoyne Goldfields with an average household wealth of \$304,000.

Australia's top ten regions ranked by average household wealth, and taking into account new LGA boundaries in Sydney, are in Sydney and Melbourne. Six of these high wealth regions are in Sydney. Melbourne's highest ranked region for this indicator is Melbourne Eastern Inner with an average wealth per household in 2017 of \$1.89 million, rising from \$1.74 million in 2016. In the period 2012 to 2017, the highest growth rates in household wealth among city regions were in Sydney Outer South West and Sydney Outer West, where household wealth grew at an average annual rate of 12.9 per cent and 12.7 per cent respectively. The highest growth in household wealth over the period in Melbourne occurred in Melbourne Eastern Outer and Melbourne Eastern Inner, where household wealth grew at an average annual rate of 7.7 per cent and 6.9 per cent respectively.

Melbourne City features at the lowest end of the scale with an average household wealth of \$344,000 as a result of the large student population now accommodated in Melbourne City and living in small apartments and as the general population of city apartment dwellers grows.

The debt to gross income ratio remains dangerously high in many of Australia's regions. Ratios remain the highest in urban regions with high levels of growth and increasing house prices as in the case of Sydney and Melbourne, however the trend is now a more general one and includes Western Australian and Queensland regions. The mortgage belts of the outer suburbs of Sydney, Melbourne and Perth are all areas where mortgages are very high in relation to incomes. Much of South East Queensland also fits this pattern. The highest debt to gross income ratio regions in 2017 are Perth Outer North, SEQ Logan Redland, Melbourne Eastern Inner, Sydney Outer South West, Sydney Outer West and WA Peel South West, all of which have a ratio of 2 plus. In all these regions the debt to gross income ratio had risen when compared to the previous year.

Not unexpectedly the debt service ratio is typically higher in metropolitan areas than it is in the rural regions. In 2017 the mortgage burden as measured by the ratio of average dwelling prices to average incomes is highest in in Perth Outer North, Melbourne Eastern Inner, SEQ Logan Redland, Sydney Outer South West and Sydney Outer West. All these regions report debt service ratios over 20 per cent, the highest currently 23.4 per cent. Debt service ratios in the top ten highest regions have increased, most but slightly, in all of these regions. In Perth Outer North the debt service ratio increased from 21.9 per cent in 2016 to 23.4 per cent in 2017. The regions with the lowest debt service ratios continue to be NT Lingiari and the ACT. These low debt service ratios go a long way towards explaining the high levels of household disposable income in these regions. The debt service ratio of average dwelling prices to average incomes has occurred in Melbourne Eastern Inner, Melbourne City, Melbourne Southern Inner, Sydney Metropolitan Core and Sydney Northern Outer Beaches. Least pressure from mortgages on households has occurred in regional areas such as NSW Murrumbidgee, NSW Orana and VIC South West.

Energy

In Chapter 9 we briefly update the state of play on climate change and on technological developments in the energy sector. The chapter concludes that local government may have an increasing role in promoting energy efficiency.

The mining sector, which has been driving the Australian economy, is changing from an investment in projects phase to a phase where production is dominant. This change is increasing the sector's demand for production energy (transport of materials and products, equipment operation and processing energy such as for LNG). Industrial energy demand is also increasing for agricultural product transport and processing as domestic and export of these products increases.

Domestically, besides export performance, population and household formation are driving growth in energy demands. Household formation is increasing at about 2 per cent per year (with regional variations) and this drives residential and, to a large extent, commercial energy demands. Each new household requires heating, cooling and appliance energy (for refrigeration, washing, etc.), plus transport and energy incorporated into clothing, food, health services and other consumption demands. These demands for energy services can sometimes be met by increases in energy efficiency but are also significant drivers of increases in demand for energy, including fuels and demand for energy capture through renewables.

Local government has a long history of involvement in the energy industries. At various times Councils have run electricity generation and distribution businesses, though these have been superseded in the Eastern States by the National Electricity Market, in WA by the South West Integrated System and other state government initiatives, and in remote areas by decentralised generation, in the NT run by the Power and Water Corporation. It is unlikely that Councils will reenter the generation business (apart from the installation of PV and perhaps wind capacity on Council properties) but possible that Councils will again be involved in aspects of reticulation. The current position is that electricity distribution is in the hands of large, cross-regional regulated monopolies, some of them privatised, which limits the scope for the reintroduction of municipal enterprise.

This said, local government has a strong interest in the reliability of electricity supply and hence in the local layout of the grid, including modifications required to meet the changed geography of supply as it moves from central to distributed generation. Other local government interests in energy efficiency include the local promotion of cogeneration – the joint generation of electricity and useable heat, which by capturing energy which would otherwise have gone to waste has considerable potential for greenhouse gas emission abatement. Energy efficiency is considerably improved by the utilisation of otherwise waste heat, and councils will often be in a position to identify sources and users and devise means to connect the two, at a minimum by facilitating the necessary easements and possibly by itself providing the service. By and large Australia does not require the high levels of domestic heating to sustain life in winter in high-latitude countries, but there will still be opportunities. Such local institutions as hospitals and swimming pools are possible places to start.

The adaptation of cogeneration to warm-country conditions which create a demand for airconditioning is under way in countries like Singapore and the United Arab Emirates and there will be a role for local government in facilitating the reticulation of cold air and water.

Apart from the past role of some councils in the electricity supply industry and the possibilities in cogeneration, local government has a strong influence on the implementation of energy efficiency programs, particularly:

the enforcement of building energy efficiency standards – both residential and commercial buildings, covering not only construction standards but such matters as building orientation. Building inspectors have traditionally concentrated on safety and fire regulations and have a very poor record in the enforcement of legislated energy efficiency standards. Even if councils are not directly responsible for the achievement of energy efficiency standards, it may be possible for them to test new buildings in order to certify that standards have been met;

- town-planning measures to encourage energy conservation, particularly in transport; and
- provision of waste management services at minimum energy cost, including such areas as methane recovery.

To drive home the importance of enforcing building energy efficiency standards the 2013-2014 CSIRO study of new 5-star housing in Melbourne, Brisbane and Sydney showed that 60 per cent of houses did not comply with the 5-star code because of poor quality installation of insulation and non-compliance to leakage guidelines. A common problem with insulation was found to be in walls and in the areas surrounding downlights in roof spaces. The CSIRO's rigorous inspection of new housing for this study used thermography and blower door testing to identify leakage and other energy inefficiencies. The report recommendations included improved training and auditing of building inspectors and training and certification of independent building thermal performance auditors. The CSIRO have also developed a software tool, AccuRate, to assist designers and architects to model their housing designs in fine detail to calculate temperatures, heating and cooling requirements and energy efficiency.

Local Government Finance

Chapter 10 discusses the current circumstances of local government finance across Australia, local government taxation revenue (mainly from rates) increased by 3.8 per cent from 2014-15 to 2015-16 (ABS government finance statistics). Given that the costs of local government service provision increased by an estimated 2.7 per cent (ABS national accounts deflator), the real increase in revenue was 1.1 per cent. Given that the population increased by 1.4 per cent, the increase in rate revenue was not quite sufficient to maintain real service expenditure per capita.

In most states and territories real rate revenue kept pace with population growth, but in NSW and Queensland it fell behind. Within each state the majority of councils followed the state trend, though in WA rate collections in the metropolitan area increased more rapidly than those in the country.

Two conclusions stand out.

- With the exception of some rate-capped councils in NSW, local government continues to set an example to other levels of government in revenue effort.
- The grants program continues to address the need for horizontal equalisation, inadequately perhaps in total funding, but effectively given the funding available. As pointed out in Chapter 2, the need is increasing, and experience with the allocation of equalisation and roads grants has potential to contribute to the allocation of funds to regional economic development strategies.

Chapter 11 of this report summarises changes to population, economy, household wealth and construction for the five major metropolitan areas of Sydney, Melbourne, Brisbane, Adelaide and Perth. The impact of the knowledge economy and the mining industry on metro areas is also discussed. These areas currently house 64 per cent of Australia's population, up 2 percentage points in just a year. In 2016-17 they accounted for 86 per cent of national population growth, with much of the remaining growth taking place in the other eight single-region cities. The aggregate population of the five metropolitan cities grew by 1.8 per cent, which was about the same as in 2015-16. The non-metropolitan population grew by 0.5 per cent, well below the 1.2 per cent achieved the previous year.



 National Economics/Australian Local Government Association
 State of the Regions 2017-18

 State of the Regions Report 2017-18 made possible with the assistance of Jardine Lloyd Thompson
 State of the Regions 2017-18

1. Trade and regional development

In Australia, regions add up to states and territories, which add up to the nation. Regional economic development accordingly adds up to national development; national decisions have regional effects and regional decisions feedback to national totals. Trade lies at the heart of this, both trade to and from Australia and trade between Australian regions.

1.1 The government of Australian trade

Recognising that economic development is founded on export earnings, in the nineteenth century the administrations of the six Australian colonies paid considerable attention to the government of trade. Each colony adopted a version of the legal and financial institutions which underpinned British trade. They invested in the infrastructure of trade, notably in ports and roads and, from the 1850s on, in telegraphs and railways. For the most part they concentrated on the facilitation of export trade but they also recognised that jobs could be generated by production for the domestic market. In particular, in the aftermath of the gold-rush mining boom, when the accessible goldfields were worked out and mining became more capital-intensive, jobs were shed and Victoria needed create employment for the young men who had rushed to the goldfields in the 1850s. The colony settled for a double-edged trade policy: infrastructure to promote exports coupled with measures to encourage production for the domestic market in competition with imports.

Both businesses and governments in the Australian colonies learnt early to borrow overseas, and much of the time they borrowed and invested wisely. Like any form of debt, overseas borrowings are most useful when they are invested to generate increased production. A further condition attaches to overseas borrowing; it should, directly or indirectly, generate not only saleable production but this production should earn foreign exchange with which to service the loan. It is possible but profligate to live above one's means by going into debt, but sooner or later comes a time of reckoning. Over a century ago over-borrowing to finance the Victorian land boom of the 1880s, led to the disastrous depression of the 1890s, an episode which underlined the need for governments to watch the balance of payments and, as far as possible, ensure that overseas borrowing is invested so as to earn foreign exchange.

The economic bargain between the colonies which created the Commonwealth of Australia melded the financial and taxation aspects of the trade policies of the six colonies into a national policy, but left infrastructure support of both export and import-competing trade with the state governments and indeed, as regards roads, with local government. Divided government did not prevent the achievement of reasonably coherent national policy – Australia is a geographically large country and industry support is appropriately governed at the regional level. This is not to claim that all the policies adopted were highly successful – for example, the export-promotion policies of the 1920s, with their emphasis on soldier settlement, placed far too many inexperienced farmers on marginal lands where they were expected to make a living producing wheat or butter for depressed world markets. However, the policy of industrial diversification pursued in those decades of depressed world markets served to maintain a moderate prosperity and also, as it turned out, prepared the country for the Second World War. It also laid the foundations for the blossoming of prosperity when export markets turned favourable in the late 1940s.

2

Like the rest of the Western world, Australia boomed during the 1950s and 1960s. These golden years were based on exports of agricultural products, supported by government investments in research and in the application of research and in marketing. Government also took responsibility for ensuring that finance was available for rural business investments. The railway network having been completed, government transport investments concentrated on bulk handling and increasingly on roads. The state governments also invested heavily on electricity reticulation in rural areas.

Like other countries during this period, Australia was committed to a fixed exchange rate. This commitment arose partly from experience during the 1930s depression, when various countries had tried devaluation as a means of export promotion. Competitive devaluation had proved a failure – it was more effective in spreading depression than in promoting exports. A fixed exchange rate also assists long-term planning and hence investment in the trade-exposed industries. This commitment does not have to be absolute – gradual changes in the exchange rate are a suitable accompaniment to gradual changes in the competitive strength of nations – but sudden troughs and spikes can be seriously disruptive. The constant exchange rate was severely tested by the Korean War spike in the price of wool in the early 1950s, which brought a windfall gain to Australia and could have caused a rapid increase in the exchange rate, followed by an equally rapid fall as the price of wool fell back. The Commonwealth elected to maintain a constant exchange rate, allowing the pastoral industry to receive a windfall benefit and keeping the competitive position of import-competing industry constant.

Though the economic growth of the post-war period was ultimately based on prosperous export industries the government of trade extended beyond export promotion. The Commonwealth took responsibility for ensuring full employment for a rapidly growing population (these were years of high immigration) and also for keeping the balance of payments under prudential control. Neither aim could be met by the export industries alone. At the level of efficiency required to maintain export competitiveness, rural industries did not generate enough jobs to maintain full employment, nor did they generate enough foreign exchange to allow the import of all the inputs to a fullemployment standard of living. The Commonwealth addressed these two shortcomings by promoting import-competing industries, which both generated jobs and saved foreign exchange.

1.1.1 Neo-liberal policy on trade

The strategy of promoting both exports and import-replacements in the context of a constant exchange rate worked well during the post-war period but ran into trouble during the 1970s. Rather than refine their trade-centred approach, Australian governments, both Commonwealth and state, stood back from the government of trade. They abandoned their special concern for exporting and for import-competing industries in favour of 'the market'. Changing circumstances which brought government responsibility for the progress of trade into question, particularly as expressed in the policies of the 1950s and 1960s, included the following.

- At federal if not at state level, assistance for import-competing industries took the form of tariffs. The fundamental weakness of tariffs as an industry-promotion policy was that they provided no guarantee that the industries they supported would be technically efficient and would graduate from their beginnings as import-competitors to a future as exporters in their own right. These shortcomings became acute as technological change increased the economies of scale and scope in industrial production and rendered the Australian market too small for efficient production in more and more industries. Tariffs were also adversely highlighted in international negotiations about access to export markets.
- After the oil price shocks of the 1970s international agreement on fixed exchange rates became much more difficult to sustain than it had been in the immediate post-war period.

- The finance sector was becoming more and more adept at avoiding regulation, as indeed the corporate sector and the rich were becoming more practised at tax minimisation and avoidance. It became harder for the authorities to ensure that finance was readily available to support the investments required for successful export-generation and import-competition.
- The Australian system of wage determination, via arbitration, failed to adjust to the oil price shocks and more generally was challenged by the diversification of skills and the entry into the labour force of people with domestic responsibilities. It failed to address cost inflation and no longer supported the achievement of full employment.

These pressures demanded a response. Rather than build incrementally on the post-war system of government of trade, Australia followed the lead of the United States and the United Kingdom by adopting neo-liberal policies under which trade would be left to ungoverned markets. The politics and intellectual underpinnings of this major policy change have been covered at length in various *State of the Regions* reports and a summary account will soon be available in Peter Brain and Ian Manning: *Credit Code Red,* to be published by Scribe, Melbourne, in July 2017. Suffice it here to note that Australia did not have a Reagan or Thatcher to impose neo-liberal policies in a single package. Instead, neo-liberal policies were adopted piecemeal with contributions from both the Labor and coalition parties and support from big business and from a new generation of academic economists. Neo-liberal economic theory arrived from the United States and spread from the universities to business apologetics, the media and in the public service. Within the Commonwealth public service, a major advocate for neo-liberal policies was the Tariff Board, which morphed into the Industries Assistance Commission and then into the Productivity Commission, but as policy officers suffused with the neo-liberal mindset were appointed elsewhere it became conventional wisdom that the market would outsmart any government.

The essence of neo-liberal policy was that governments should leave economic decisions to markets. Their functions should be confined to continued provision of the legal structures under which trade is conducted – the laws of contract and property (including intellectual property) and laws governing trade practices, occupational health and safety, product safety, environmental standards and the like. They should continue to enforce law and order and provide for defence, and it was permissible for them to support market production by providing roads, public education and public health services. More controversially, governments should promote competition. Neo-liberal theorists were particularly suspicious of trade unions, who, they claimed, were preventing desirable competition for jobs. To enforce such competition, Australian governments abandoned their former aim of full employment and targeted an unemployment rate of around five per cent, which, they believed, would adequately discipline the labour force. The Commonwealth government became adept at maintaining this level of unemployment: wherever the rate moved above target, the government would transfer sufficient Centrelink clients from unemployment-related benefits to disability support pension, while wherever the rate moved below target, the government would supply immigrants to ensure that there was a competitive supply of job applicants. The theorists were also aware that business was tempted to anti-competitive behaviour, and for a while Australia had a National Competition Policy. However, this provided but weak discipline, pitted as it was against market power based on economies of scale, incumbent advantages and the like.

The adoption of neo-liberal policies at national level required the Commonwealth government, at least, to turn away from its long preoccupation with the government of trade and instead leave exports, imports and capital flows to be determined by markets. In particular:

 financial deregulation left the exchange rate to market forces. The resulting wide swings in the exchange rate increased uncertainty and disrupted investment planning in the trade-exposed industries;

- financial deregulation also put an end to preferences for exporting and import-competing industries in the allocation and price of investible funds;
- tariffs were cut along with other on-budget industry assistance measures, including those for exporting industries;
- the new rule against government borrowing, coupled with priority for tax cuts and the social security costs of the new market-driven level of unemployment, reduced the funds available for infrastructure construction, including such construction to assist trade-exposed industries; and
- the privatisation of public utilities removed cross-subsidies for trade-exposed industries, except where they were written into the privatisation contracts.

These changes did not put a complete end to government interest in trade. Negotiations continued over free-trade agreements and Austrade continued to support Australian exports, albeit on a curtailed budget. Commonwealth tax concessions such as fuel tax rebates and fringe benefits tax exemptions remained for favoured exporting industries, particularly mining. Though their investment budgets were trimmed as required by the Commonwealth and the finance sector, state and local governments from time to time departed from the neo-liberal consensus and attempted to attract new industries which would earn income from overseas and interstate sales. The policy instruments available to them were limited; for example, Councils could be understanding on zoning requirements; some of them managed to invest in infrastructure such as industrial estates and some offered rate relief, but the funds available were never sufficient to have anything other than a marginal effect on private-sector decisions. According to neo-liberal theory this was as it should be, since the theory held that free markets shorn of government interference would promote efficiency and so raise productivity. At the macroeconomic level this required market determination of the exchange rate and of the components of the balance of payments – exports, imports, capital flows.

Against the background of these policies, for the best part of two decades the *State of the Regions* reports have made the case for greater Commonwealth (and state) interest in regional economies, including a willingness to direct investment funds to regional development. For many years the arguments for central funding of locally-directed economic development strategies made little headway, thanks to a general complacency that neo-liberal policies were delivering prosperity and economic growth – though it had to be admitted that the neo-liberal era got off to a shaky start when the boom of the late 1980s was followed by the 1990 recession. The subsequent years of prosperity – the land boom of the early 2000s and the mining boom which followed it – were at first hailed as the just reward of the neo-liberal reforms of the 1980s and 1990s, but gradually it has been realised that the foundations of recent prosperity are not as secure as the theoreticians assumed.

1.1.2 Problems with neo-liberal policy

Neo-liberal theory holds that governments (including local governments) are incapable of wise investment and should therefore never borrow, whereas private businesses can borrow as much as they like because they are the best judges of their own exposure to returns and to risk. With exceptions immediately after the GFC, the balance of payments deficits which Australia has run in the neo-liberal era have not been due to government borrowing (they are not budget deficits) but have been due to private sector borrowing, pre-eminently by the deregulated banks. This has ensured that neo-liberal commentators regard them as benign.

Is this so? The obvious point, which has been laboured in previous *State of the Regions* reports, is that much of the banks' overseas borrowing has been on-lent on mortgages, resulting in a major increase in household debt and contributing to the increases in the price of residential land. There is little in this to give comfort that the overseas borrowings have been invested so as to generate foreign exchange income to service the loans.

A major premise of neo-liberal policy was that intensified market competition would increase productivity by forcing businesses to be more efficient. In trade-exposed industries, those relying on export markets and/or competing with imports, the intensity of competition was increased by withdrawing industry assistance – most obviously tariffs, but also various other kinds of marketing and product development assistance. Withdrawal was patchy and it is arguable that disguised assistance remained for many industries. Even so, the trade-exposed industries as a group experienced strong overseas competition, particularly during periods when the Australian exchange rate was high. An unexpected effect of the neo-liberal reforms was that the Australian dollar exchange rate gyrated up and down, interfering with forward planning in the trade-exposed industries, increasing risk and dampening investment.

A second group of industries in which the intensity of competition increased comprised those where there is relative ease of entry. The increase in unemployment intensified competition in these industries as people who would otherwise be unemployed struggled to gain the respectability of employment.

Neo-liberal policy relies very strongly on incentives and rewards. If markets are to yield general benefits, it is essential that they reward hard work and prudent behaviour, including saving and the careful allocation of resources to new opportunities. It is equally important that they do not reward corruption and that they generate minimal economic rents, where an economic rent is defined as a payment in excess of that required to ensure that the job is done. Economic rents cannot be avoided completely – the classic example is the rent of land. Landowners receive payments for the use of their land, but these are economic rents because the land will not disappear if the payments are not made; the classic justification for offering rent on land is to ensure that the resource is allocated efficiently, but not as a reward for creating land. Because rents cannot be avoided completely, there is always a grey zone between justified and unjustified (or economically inefficient) rents, but at the same time economic history is crammed with examples of excessive economic rents which give rise to perverse incentives. For example, Thomas Piketty in *Capital in the Twenty First Century* gives the example of ambitious young men living under the ancient regime in France, where wealth was so unequally distributed that the potential returns from courting and marrying an heiress was very much larger than the return to any form of productive work.

Recent research by the World Bank and others has documented a negative correlation, at the national level, between income inequality and economic growth. Neo-liberal theory defends inequality as necessary to provide incentives to efficient production, but questions arise. First, at the bottom end of the income distribution, is the target rate of unemployment of 5 per cent really necessary to undergird the incentive to work and ensure that workers do not band together to earn economic rents? Unemployment has a quadruple cost: the foregone production of the unemployed people, the cost of loss of their skills, the personal costs inflicted on them and the public costs of supporting them. As the *State of the Regions* reports have documented, in Australia unemployment is unevenly distributed across regions which means that a national rate of 5 per cent requires very much higher rates in disadvantaged regions.

At the wealth end of the spectrum, high rewards to unproductive activities can generate misdirected effort. As will be explained in *Credit Code Red*, one of the marked features of the neo-liberal era has been the generation of current account deficits on the balance of payments which in all previous times would have been regarded as excessive and dangerous. The deficits have emerged as the net result of a surge in Australian overseas investment (superannuation funds, indeed institutional

investors and investors generally have diversified their portfolios to include more overseas assets) and an even greater surge in overseas Australian overseas borrowing, chiefly by the banks – unlike many other countries, the government has not been a significant borrower. The increase in overseas debt would not have been possible without the neo-liberal reforms, and the danger of it is that, as loans come due, they must either be repaid or refinanced. Repayment would involve much belt-tightening as imports are cut in order to divert export revenue to repaying loans, but refinancing is risky since it is up to the overseas creditors whether they want to keep lending. There are many precedents for indebted countries which have suffered severe economic stress when they have been unable to service their borrowings, due, say, to a fall in the prices they receive for their exports or perhaps due simply to a change in investor sentiment in the lending countries. There is also ominous precedent for lending countries using their financial dominance for political purposes.

This is not the place to belabour these risks, nor is it the place to consider their regional distribution, but rather to point out that corrective action is required and to consider its regional consequences. Corrective action will require a revival in the long-established Australian concern for the trade-exposed industries, a revival which will have strong regional consequences. In particular:

- action is required to stabilise the exchange rate. The unpredictable ups and downs in the exchange rate since financial deregulation have increased uncertainty and risk in the trade-exposed industries, hindering long-term investment. If this cannot be done, there will still be a need for action to manage exchange-rate risk at the industry level, particularly for those industries which are unable to manage the uncertainties with their own resources;
- action is required to increase investment in the trade-exposed industries, particularly those which were overlooked during the mining boom. The potential policy array is familiar and includes such areas as skill supply, finance, product development and marketing, infrastructure and risk sharing. There is an accompanying need for industry strategies which take advantage of industry knowledge and address particular developmental needs on an industry basis; and
- these needs intersect with the actions required to promote regional development. In particular, action is required to develop strategies to boost the prospects of trade-exposed regions.

That these actions should still be required reflects poorly on the neo-liberal reforms, which were promoted as addressing the same perennial questions. The exchange rate was floated in the expectation that it would reach a sustainable level and allow the Reserve Bank to adjust interest rates as required to maintain steady economic growth. The chief proponents of free trade were exporting industries and regions, which argued that industry support was excessively directed to import-competing industries and raised costs and reduced competitiveness in the exporting industries. They expected that the removal of these costs would usher in a new era of prosperity in the exporting industries and regions, but it seems that the expected prosperity was captured by the trade-sheltered industries and the metropolitan centres. The advocates of neo-liberal reform were indeed justified in asserting that incompetent government wastes resources, but the only solution is competent government – one might say ethical government; as prudent and just as is humanly possible. The experiment of leaving government to the market has instead encouraged prodigal levels of overseas borrowing and has generated national economic vulnerability.

As the focus of government policy moves towards Australia's economic relationships with the rest of the world, it will no longer be possible to maintain living standards by borrowing. Not only will this direct policy attention to the export and import-competing industries and to the regions which support these industries; it will concentrate attention on the productivity of these and other industries, not only as the source of their international competitiveness but as the basis of domestic prosperity and incomes.

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1.2 Productivity

Productivity increases when a greater flow of desired outputs is extracted from a given stream of inputs. The most readily available measures of productivity relate the value of production to just one input – labour. Increasing the productivity of labour is partly a matter of accumulating skills and capital and more chiefly a matter of increasing the value generated from the national resource: the land, the people and their accumulated savings and technologies.

There have been continual attempts to improve the measurement of productivity to take non-labour inputs into account, especially capital, but they run afoul of measurement difficulties. In the *State of the Regions* reports we concentrate on labour productivity while remembering that non-labour inputs to production, particularly capital, lay claim to some of the income generated.

Trends in Australian productivity from 1978 to 2012, by industry, were discussed at length in Chapter 8 of the *State of the Regions* report for 2013-14, complete with statistical caveats. A brief update of trends over the past quarter century is provided in Table 1.1, in which industries are divided into three groups.

- Market industries, being those financed wholly or largely from sales revenue.
- Non-market industries, being those which are financed largely from taxation and operated chiefly by non-profit institutions. They include government administration, defence, education and health services, among others.
- Finance is listed separately as a quasi-market industry, since it is financed partly from revenue from the sale of services but also, substantially, from the differential between the cost of borrowed funds and the interest received on the funds it lends.

Across all economic activity, productivity (value added per hour worked) increased at over 2 per cent a year from the bottom of the 1990 recession to the middle of the urban land boom in 2004, after which its growth rate slackened off – the cause of much consternation at the time. Productivity growth in the market industries initially averaged a little over the average rate for Australia as a whole, then slipped back to the average. Growth in the non-market industries was below the national average in all periods except the most recent. The third industry group, finance, reported spectacular productivity growth in the 1990s and to this day its productivity has been growing more rapidly than national average.

These trends raise two questions:

- Has productivity growth in the non-market industries been suppressed?
- Though the reported increase in productivity in finance undoubtedly indicates an increase in income generated per hour, was this income due to the exercise of market power to generate economic rents?

We will discuss these questions later, asking whether regional and industry data can throw any light on them. To make use of regional data it is, however, necessary to shift from the National Accounts definition of value added to the regional concept of income generated. The income generated by employers operating in a region is paid out to regional residents in two forms:

- wages and salaries; and
- income from small, locally owned business, which mixes the proprietor's wages with his or her capital returns.

A further component of value added, the corporate businesses operating in a region generate gross profits, including depreciation allowances, is not paid directly to local residents. Instead, it is pooled business-wide and distributed to:

- corporate gross savings, which are applied to capital accumulation across the business (including new and replacement construction and equipment, product development and other investments); and
- payments to shareholders via dividends, share buybacks and the like.

Corporate gross savings do not enter directly into household income (though they may contribute to capital gains) while payments to shareholders are distributed, not to the regions where they were earned, but to shareholder addresses, including overseas. Since most shares are held by institutions including superannuation funds, profits percolate through to households as rewards to wealth rather than as rewards for local economic activity.

Regional value added, or regional income generated, thus comprises wages, salaries and business mixed income. The final row of Table 1.1 shows the rate of growth, at national level, of income so defined per hour worked. It is noticeable that from 1991 to 2000 this rate of growth was less than the growth of productivity more broadly defined, reflecting a shift in the distribution of income from labour and small business to corporate profits. In the early part of the land boom local income caught up a little, only to fall behind from 2004 to 2009. However, since 2009 local income has, on average, grown more rapidly than national productivity.

Table 1.1 Growth in lab	Growth in labour productivity (c_{CVM} per hour worked, % p.a.) – Australia, 1991 to 2016											
	1991.3 to 1996.2	1996.2 to 2000.2	2000.2 to 2004.3	2004.4 to 2009.4	2009.4 to 2016.2							
Market	2.3	2.7	2.5	1.1	1.4							
Non-market	0.3	1.1	1.1	0.3	1.4							
Finance	5.6	6.1	3.3	2.5	2.1							
Total	2.1	2.5	2.3	1.1	1.4							
Direct household income	1.5	2.1	2.5	0.4	1.9							

	Source:	ABS, National Accounts and Labour Force Survey.
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In Table 1.2 industries are ranked according to their contribution to regional income, per hour worked. The table covers a long time period – a decade – to smooth out short-period variations due in fluctuations in capacity utilisation and temporary movements in industry sale prices, as well as changes in earnings due to wage catch-ups. The table uses the ABS CVM¹ method to index values over the decade, and cobbles together data from the National Accounts and Labour Force Survey, so may not be completely accurate. However, the general picture is clear.

The regional income generation rate per hour worked varies considerably by industry, with finance and insurance the most munificent to its workers and accommodation and food services the least. On average, an hour worked in finance yields as much regional income as three hours worked in hospitality.

¹ CVM = chain volume measure, which is flows of constant 2014-15 value converted from current values by the ABS using their chain volume methodology.

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There is a general association between the income generation and productivity more broadly defined. On average industries pay out two-thirds of their gross value added in regional income. However, the proportion paid out varies considerably by industry, being particularly low – around 30 per cent – in two capital-intensive industries, mining and electricity, gas and water, and particularly high in non-profit industries such as public administration and education, and in industries characterised by small business, such as administrative services.

Table 1.2GVA and local income per hour worked, by industry, Australia, average from 2006 to 2016											
Industry	local income per hour worked (\$ _{сvм})	GVA per hour worked (\$cvм)	Ratio income/ GVA (%)								
Finance and insurance	69	159	43								
Mining	64	221	29								
Administrative services	54	77	100								
Wholesale trade	54	68	80								
Pubic administration	54	59	92								
Electricity gas water and waste	52	170	31								
Professional and scientific services	51	60	86								
Rental, real estate	48	112	43								
Information, media, telecommunications	45	107	42								
Construction	44	67	66								
Education	43	49	92								
Transport, warehousing	40	71	56								
Manufacturing	39	57	68								
Other services	31	36	88								
Agriculture, forests, fishing	31	58	54								
Health services	30	49	61								
Arts and recreation	30	49	61								
Retail services	26	37	72								
Accommodation and food	23	35	66								
Total	44	66	67								

Source: ABS National Accounts and Labour Force Survey.

Table 1.3Average loAustralia,	Average local income per hour worked and its rate of growth by broad industry group – Australia, 1992 to 2016									
Industry group	Av 1992- 16 (\$)	r.g. 1992- 16 (%)	Av 1992- 09 (\$)	2000-08 (\$)	2009-16 (\$)	r.g. 92-08 (%)	r.g. 2000- 16 (%)			
Trade exposed	36	1.9	30	36	41	2.1	1.8			
Easy entry	26	1.5	23	25	28	1.5	1.5			
Other market sheltered	45	2.2	36	45	51	3.0	1.5			
Non-market	43	1.9	36	42	48	2.0	1.8			
Finance	57	3.7	41	57	70	4.6	2.7			
Total	39	2.2	32	39	44	2.5	1.9			

Notes: Trade exposed industries: agriculture, mining and manufacturing.

Easy entry industries: retail, accommodation, food services, repairs, cleaning and waste management. Other market sheltered industries: all other market industries including electricity, gas supply, water supply, sewerage, construction, transport, telecommunications, information, media, real estate, professional services, arts and gambling.

Non-market industries: public administration, defence, education, health services and residential care.

Source: ABS National Accounts and Labour Force Survey.

Finance: finance and insurance.

Table 1.3 provides an alternative classification of industries into five major groups.

Though the trade-exposed group includes mining, which is highly paid, for the group as a whole both average income generation per hour worked and average growth in income generation per hour worked have been a little below the economy-wide average – a situation which is not healthy in a trade-exposed economy. Overseas competition has been effective in limiting income growth in these industries.

The easy-entry group of industries comprises personal services which, though there is some provision by large corporate businesses, are also relatively easily entered by small businesses with low capital. They mainly sell to the domestic market, though their operations in the tourism market are trade exposed. They generate low incomes, which have been growing at less than the economy-wide average rate. Competition in the domestic market has been effective in limiting income growth in these industries.

Other market industries sell mainly to the domestic market, though some, such as transport (particularly air transport) also sell overseas. These industries are sheltered from overseas competition for various reasons – some provide location-specific services (like construction), some lack means of transport to and from overseas (like electricity and until recently gas, at least on the East Coast) and many require personal contact between the service provider and the recipient. They differ from the easy-entry group in that barriers to entry provide at least moderate shelter from domestic competition. In some cases, such as professional services, the barriers are due to the qualifications required, and in others, such as electricity supply, they are due to capital requirements. Income generation per hour worked in these industries has been consistently above national average and conspicuously above the average for the trade-exposed industries. There is at least a prima facie case that these industries have exploited their relative freedom from competition to enhance their regional income returns.

The non-market industries are mainly tax-financed, and their rate of growth of income generated per hour worked has been similar to the trade-exposed industries. However, they require better qualifications than average, and this is reflected in their average income generation per hour worked. The relatively low rate of growth of regional incomes in these industries cannot be associated with lack of competition for sales, since they are tax-financed; instead, it reflects s different sort of competition, the competition between the tax-financed sector and the sales-financed sector for access to funds. During the neo-liberal era the balance has been firmly in favour of tax cuts and hence in favour of the sales-financed, market industries and the finance sector.

Finally, as already noted, finance has been the high flyer of the neo-liberal age. Not only does it generate income per hour worked substantially above national average; the differential has been growing and average income generation per hour worked in finance has reached 60 per cent above average.

These differentials cannot but affect regional income generation. Incomes generated in tradeexposed regions, particularly those with a heavy infusion of easy-entry services, will tend to be low; incomes generated in financial districts will be high. These connections are emphasised in the *State of the Regions* reports, but do not appear in recent work by the Productivity Commission. Even so, this work can be used to introduce discussion of the fortunes of Australia's regions.

1.3 The Productivity Commission on regional transitions

The Commonwealth's in-house economic think tank, the Productivity Commission, has long been committed to neo-liberal theory and hence to the proposition that a market-based, competitive economy generates steady economic growth, not only nationally but region by region. Accordingly the initial (i.e. pro tem) report entitled *Transitioning Regional Economies* issued by the Commission in April 2017 can be taken as an application of the tradition that markets, appropriately organised, provide the best solution to economic problems including the problems of regional development.

The occasion for the report was the end of the mining boom. The terms of reference for the inquiry, as signed by the Treasurer, are as follows: *"the Commission should identify regions which are likely, from an examination of economic and social data, to make a less successful transition from the resources boom than other parts of the country ..."* The concept of transition implies a sequence by which a region which is at first operating normally experiences a disruption followed by a transition to a new normality.

In its discussion of this sequence, the Commission defines normality is a 'long run growth path' while a disruption is an interruption to this long-run path. "If a disruptive event is identified, then the growth experience following the event can be used to categorise the region as resistant, ... resilient (or) non-resilient." If the region is resistant, "the event does not disrupt the growth path. The identification of this type of region is problematic unless the event is identified externally by means other than observing growth in the region" – in other words, if growth is steady it is doubtful if a disruptive event has occurred. Second, if a region is resilient, "following the disruption the regional economy recovers and returns to a positive growth path" while if the region is non-resilient, it "is unable to recover from the disruption." (p 7). In this way economic growth is stylised as a series of equilibriums, and a successful region is one which not only achieves its growth equilibrium but can quickly transition from one growth equilibrium to another.

The Commission does not commit itself to the view that the mining boom represented a stable growth path, though it avers that the boom generated great national benefit. NIEIR agrees with this view as regards Western Australia and some of the Queensland regions, but queries it nationally. The difference lies in the estimation of the effects of the mining-boom plateau in the exchange rate. In NIEIR's view, the Commission's equilibrium-based modelling fails to take sufficient account of the costs of this over-valued exchange rate.

Later in its initial report, the Commission concedes the limitation of thinking in terms of stable growth subject to occasional disruptions. "Although transition and development are distinct concepts, for practical purposes, strategies to facilitate a regional community's economic development are the same as those that enable it to adapt well to changing circumstances." (p117) Against this background, the Commission proposes a 'tiered model of policy support' under which 'targeted support' would be reserved for 'less adaptive' regions which have suffered 'more severe' disruption, where 'more severe' is 'unforeseen/permanent/pervasive' (pp118-9). NIEIR agrees that "governments have a finite capacity to assist regions, and must balance supporting those people in regional communities who are in greatest need with promoting conditions for transition and development among all regions." However, if support is to be "structured according to the nature of change affecting a region and the region's adaptive capacity" it is necessary to have metrics for 'nature of change' and 'adaptive capacity'. The Commission recognises that governments will "need to assess the severity of circumstances facing an individual region. This is a task best undertaken at a local level and on an ongoing basis." Once again NIEIR agrees wholeheartedly that local knowledge is essential to successful investment in regions, but those who allocate the funds need criteria for allocation and rival regions which are competing for funds need an appropriate metric to argue their case. Without guidelines as to how 'severity of circumstances' are to be assessed regions will have difficulty in making their case for assistance.

The Commission begins its search for guidelines for the provision of assistance by spotlighting change arising from a 'significant disruptive event' and poor adaptive capacity due to lack of 'adaptability' or 'resilience'. Concerning the first of these concepts, the Commission admits defeat. "From an examination of economic growth over time, it might be possible to identify regions that have experienced a significant disruptive event..." However, the Commission continues with the observation that "in practice, operationalising this concept has proved challenging with the time series data available and the level of regional disaggregation possible. It has been difficult to observe events at a regional level that are out of the ordinary... The analysis of employment data suggests that regions are constantly experiencing ups and downs." (pp7-8)

Concerning the second concept, the Commission has constructed a 'single economic metric of relative adaptive capacity'. Ideally, the Commission would have preferred to construct this metric by identifying regions which have responded resiliently to disruptive events. However, given its inability to identify such events, the Commission resorted to listing, a priori, local population attributes which it believed would be associated with adaptive capacity. It then extracted a single value out of this potpourri using principle component analysis. In this process, the Commission used mainly Census data on residential population, with no allowance for commuting, to produce an index of adaptability which turned out to be highly correlated with the ABS SEIFA (socio-economic indexes for areas) measure. This is not at all surprising, since the Commission had essentially reasoned that nothing succeeds like success. It selected as the ingredients of its index population attributes correlated with current high incomes. Its index of adaptability is based on the argument that regions with high-status residential populations have succeeded and therefore must be adaptive.

Given that 'significant disruptive events' cannot be identified while 'adaptive capacity' is essentially low socio-economic status, the Commission does not seem to have advanced very far in its discussion of the best way to allocate funds for regional development. However, in the final chapter of its report it introduces a different set of principles. "*The Commission believes that place-based policies are likely to be more effective than subsidy-based policies, though the latter remains (sic) a significant part of government policy. Guided by this way of thinking, strategies to support regional transition and development should:*

- take a coordinated, strategic approach led by the regional community;
- build on a region's relative strengths (comparative advantage);
- invest in the capacity of people in regional communities and the region's connections with other regions and markets; and
- promote sustainability, so that projects and programs are viable without long-term government financial support." (p121)

There is much to be said for these principles, whatever the socio-economic status of the residents of a region. In particular, the principle that a coordinated, strategic approach should be led by the local community provides a central role for local government and highlights the need for capable local councils and local associations of councils.

Much of the Commission's more detailed advice on regional development reflects its pro-market mindset, including a tendency to blame any lack of regional economic vibrancy on regulations which stifle the natural buoyancy of the market. However, the Commission also finds space to commend regional planning which focuses on each region's relative strengths as locally perceived (p134). It commends "investment in human capital (p140), in transport and in the NBN, but cautions that 'governments' planning and selection of infrastructure projects should be informed by rigorous and transparent cost-benefit analysis..., robust public consultation, public reporting and evaluation, explicit and detailed consideration of available alternatives...(and) transparent and competitive processes for selecting private sector partners." (p143) These conditions can be interpreted two ways, either as aspirations or as evaluation standards set so high that no project will survive them.

Perhaps an older ethical language might provide a helpful substitute, emphasising awareness of the social and natural environment and combining prudence, shrewdness and humility with imagination and adventurousness in the face of uncertainty.

As regards regions assessed as non-resilient (that is, regions lacking prospects of economic growth) the Commission recommends that assistance should be concentrated on disadvantaged residents, either assisting with their migration to better-favoured regions or with upgrading their skills to participate in such development opportunities as may arise in their home region. The Commission is not at all enamoured of "assistance that creates false expectations about the future success of an industry or economic activity" and finds that "assistance to industries and regions has often been costly, ineffective, counter-productive, poorly targeted and inequitable. To avoid these problems, support to assist people to adapt is best provided within the context of a coordinated, strategic development framework designed to capitalise on a region's strengths and to facilitate self-sustaining growth." (p153) Once again the principles are fine, but require great wisdom and discernment if they are to be applied in practice. Indeed, they are so daunting that they could bring policy paralysis if taken literally.

Two relevant concepts seem to be missing from the Commission's discussion. The first missing concept is that of uncertainty. This concept is present in the report – it is inherent in the idea of a disruptive event and pervasive in the observation that regional economies are constantly being buffeted by such events – but it is not named. It is instead smoothed over in the idea of a steady equilibrium growth path and no more than tenuously present in the idea of transition between equilibrium and equilibrium. The consequences of the pervasive uncertainty of regional economic growth include the following.

- Some investment proposals will inevitably fail. Though much can be done by investment assessment and scenario planning, the failures cannot be predicted in advance.
- Capitalism deals with uncertainty by various financial devices, notably equity investment and venture capitalism. These should be matched against the level of uncertainty.
- Uncertainties can be reduced by sharing. Risks can be pooled through insurance but this is not technically possible as an approach to uncertainty. Multi-national companies put together portfolios of uncertain enterprises which they hope will, together, achieve satisfactory returns. Uncertainty can also be pooled through government and in particular the management of uncertainty can be a strength of a federal polity with local governments. The uncertainties of individual life are part-shared through the social security system; regional uncertainties are shared through such mechanisms as horizontal equalisation grants to local government.
- There is no rule against governments shouldering risks and uncertainties indeed, when one considers such areas as defence planning, they are a fundamental fact of public life. When it comes to economic uncertainty, the existence of uncertainty should be acknowledged from the start and auditors general should recognise this when reviewing government investments. From the start, investment assessment, including cost-benefit and distributional analysis, should include assessment of uncertainty. The extent to which uncertainty can be socialised through government (and at which level of government) and the opportunities to have it borne by groups with risk appetites should be considered, including the trade-off between the costs of socialising the uncertainty and the costs of having it borne by sub-groups both domestic and overseas.

The second missing concept is that of the economic base. This concept is mentioned briefly where the Commission attempts to define economic resilience (p 46) but does not otherwise enter into the discussion. Yet going back to the nineteenth century and the twentieth century up to the 1980s, Australian governments had a very well-developed concept of economic base and concentrated their policies on strengthening this base. If a country, or a region, has a sound economic base, markets can

be relied on to build on the economic base and provide those local services which are suited to business provision and taxes. Tax-financed services can be relied on to provide the rest, such as roads, education and health services. The question of what constitutes a region's economic base will be addressed in Chapter 6.

This said, the Commission is on agreed ground when it recommends that regional economic development should build on each region's relative strengths and requires investment in the capacity of people in regional communities and the region's connections with other regions and markets. The rest of this report is devoted to the question as to what should be included in a regional economic strategy.

When describing trends at the regional level, it is useful to refer to a general classification of regions. In the remainder of this chapter we update the classification used in *State of the Regions* reports since their inception.

1.4 Classifying SOR regions

The second *State of the Regions* report, that for 1999, divided Australia into 58 regions, classified as follows.

- Core metropolitan;
- Dispersed metropolitan;
- Production zones;
- Resource-based;
- Rural-based; and
- Lifestyle.

This classification was put forward impressionistically yet in many ways has stood the test of time. However, 26 years of work allow us to firm up the classification and also to be a bit more precise in addressing the perennial problem of those who would classify LGAs or regions: while it is possible, for each type of region in the classification, to name one or more archetypical regions, there are many regions which exhibit mixed characteristics and are accordingly difficult to classify.

In subsequent reports the number of regions was increased, largely to subdivide a number of very large regions. Regional boundaries were also updated for changes in local government boundaries and to increase the internal homogeneity of regions. The difficulties of allocating regions unambiguously to one or other category led to a reduced emphasis on regional classification. Even so, it is helpful to classify regions according to their economic base. The 1999 classification was largely intuitive, but experience has shown that the intuitions were helpful; in this year's report we accordingly update and formalise the classification. The proposed categories are:

- Core metropolitan;
- Commuter suburbs;
- Mining-based;
- Agriculture-based;
- Lifestyle; and
- Independent cities.

Core metropolitan regions are those where more than 35 per cent of the region's jobs are taken by commuters from neighbouring regions – daily commuters as distinct from fly-in fly-out commuters – AND the number of inbound commuters exceeds the number outbound.

Commuter suburbs are regions where more than 37 per cent of working residents work in another region with net outbound commuting.

Mining-based regions are those where mining and primary mineral processing are responsible for more than 60 per cent of regional exports.

Agriculture-based regions are those where agriculture and food processing are responsible for more than 28 per cent of regional exports.

Lifestyle regions are those where accommodation and food services (hospitality) generate more than 10 per cent of regional exports, plus regions where more than 20 per cent of disposable income is received as benefits.

Independent cities comprise the remainder.

A supplementary binary classification is into regions with more or less than 21 per cent of GVA in trade-exposed industries. Trade exposed industries are here defined a little more broadly than they are in Table 1.3 above, as those with substantial overseas exports and/or substantial import competition, including agriculture, fishing, agricultural support (but not forestry), coal mining, gas and oil extraction, metal ore mining (but not mineral exploration or quarries for construction materials), manufacturing (tout court), accommodation (but not food services), rail, air and other transport, postal and courier services, publishing, movie and video making (but not internet publishing), and tertiary education (but not school education). Obviously there are marginal inclusions and exclusions; for example, rail, air and other transport are included because they serve substantial overseas trade flows even though they also serve sheltered domestic markets, while road transport is excluded because the share of overseas trade flows in total activity is less than for rail or air.

These criteria generate the following classification of regions.

Sydney Metropolitan Core: core metro; trade sheltered.

Sydney Eastern Shores: commuter suburbs (marginal to core metro, thanks largely to employment round the airport): trade exposed (air transport).

Sydney Mid West: commuter suburbs (marginal to core metro, with substantial inbound commuting): trade exposed (manufacturing).

Sydney Near West: commuter suburbs (marginal to core metro, with substantial inbound commuting): trade sheltered.

Sydney Outer North Shores: commuter suburbs: trade sheltered.

Sydney Outer South West: commuter suburbs: trade sheltered.

Sydney Outer West: commuter suburbs: trade sheltered.

Sydney Parramatta Ryde: core metropolitan (marginal to commuter suburbs, with substantial outbound commuting): trade sheltered. This is the only core metropolitan region which is not a state capital – Melbourne lacks an equivalent.

Sydney South East: commuter suburbs: trade sheltered.

NSW Central Coast: Independent city: trade sheltered.

NSW Central West: Agriculture-based (despite substantial mining activity): trade exposed.

NSW Coastal Hunter: Independent City: trade sheltered (marginally).

NSW Inland Hunter: Mining-based: trade exposed.

NSW Illawarra: Independent City: trade sheltered (marginally).

NSW Murray Far West: Agriculture-based: trade exposed.

NSW Murrumbidgee: Agriculture-based: trade exposed.

NSW North Coast: Lifestyle (benefit-based): trade sheltered.

NSW Northern Inland: Agriculture-based, trade exposed.

NSW Northern Rivers: Lifestyle (benefits and hospitality both significant); trade sheltered.

NSW Orana: Agriculture-based (despite mining activity): trade exposed.

NSW Southern Tablelands: Lifestyle (hospitality - despite significant agriculture and outbound commuting): trade exposed (marginally thanks to its agriculture).

NSW South Coast: Lifestyle (both benefits and hospitality): trade sheltered.

Melbourne City: metropolitan core: trade sheltered.

Melbourne Eastern Inner: commuter suburbs (marginal to core metropolitan, with substantial outbound commuting): trade sheltered.

Melbourne Eastern Outer: commuter suburbs: trade sheltered.

Melbourne Northern Inner: commuter suburbs (marginal to core metropolitan, with substantial inbound commuting): trade sheltered.

Melbourne Northern Outer: commuter suburbs: trade exposed (airport, manufacturing).

Melbourne Southern Inner: commuter suburbs (marginal to core metropolitan, with substantial inbound commuting); trade sheltered.

Melbourne Southern Outer: commuter suburbs: trade sheltered.

Melbourne Western: commuter suburbs: trade sheltered.

Vic Geelong: Independent city: trade sheltered.

Vic Gippsland: Lifestyle (benefits based – marginal to mining-based and agriculture-based): trade exposed (mining, agriculture – there is sufficient agriculture and gas that the region remains trade exposed even if brown coal is reclassified to trade sheltered).

Vic Grampians: Agriculture-based: trade exposed.

Vic Hume: Agriculture-based: trade exposed.

Vic Loddon Mallee: agriculture based: trade exposed.

Vic South West: agriculture based: trade exposed.

SEQ Brisbane City: metropolitan core: trade sheltered.

SEQ Gold Coast: Lifestyle (hospitality): trade sheltered.

SEQ West Moreton: commuter suburb (marginal to agriculture-based): trade exposed (manufacturing, agriculture).

SEQ Logan Redland: commuter suburb (marginal to core metropolitan, with substantial inbound commuting): trade sheltered.

SEQ Moreton Bay: commuter suburb: trade sheltered.

SEQ Sunshine Coast: Lifestyle (both benefits and hospitality): trade sheltered.

Qld Darling Downs South West: agriculture-based: trade exposed.

Qld Far North Torres: Lifestyle (hospitality): trade exposed.

Qld Fitzroy Central West: Mining-based: trade exposed.

Qld Mackay: Mining-based: trade exposed.

Qld Townsville North West: Mining-based: trade exposed.

Qld Wide Bay Burnett: Lifestyle (benefits – marginal to agriculture based): trade exposed (agriculture).

Adelaide South: metropolitan core: trade sheltered.

Adelaide North: commuter suburb: trade sheltered.

SA East: Agriculture-based: trade exposed.

SA Far North and West: Mining-based: trade exposed.

SA Fleurieu: Agriculture-based (marginal to commuter suburb, with substantial outbound commuting, also to lifestyle based on benefits): trade exposed.

SA North: Agriculture-based: trade exposed.

Perth Central: Metropolitan core: trade sheltered.

Perth Outer North: commuter suburbs: trade sheltered.

Perth Outer South: commuter suburbs: trade sheltered.

WA Gascoyne Goldfields: Mining-based: trade exposed.

WA Peel South West: Mining-based: trade exposed.

WA Pilbara Kimberley: Mining-based: trade exposed.

WA Wheatbelt Great Southern: agriculture based: trade exposed.

Tas Hobart South: Lifestyle (benefits): trade sheltered.

Tas North: Lifestyle (benefits): trade exposed (agriculture, manufacturing).

Tas North West: Agriculture-based (marginal to lifestyle – benefits): trade exposed.

NT Darwin: Independent city: trade sheltered.

NT Lingiari: Mining-based: trade exposed.

ACT: Independent City: trade sheltered. The ACT lacks the level of commuting required for it to be classified as core metropolitan.

It will be noted that

- all 6 core metropolitan regions are trade sheltered;
- all 6 independent cities are trade sheltered;
- all 15 agriculture-based regions are trade exposed;
- all 9 mining-based regions are trade exposed;
- 16 commuter suburb regions are trade sheltered but 4 are trade exposed; and
- 6 lifestyle regions are trade sheltered and 5 are trade exposed. Of the three lifestyle regions which depend primarily on hospitality rather than benefits, two are trade exposed and one is trade sheltered.

Over the 24 years 1992-2016 the contribution of the trade-exposed industries to GVA has declined. This does not necessarily mean that the overall trade exposure of Australian production has declined; it is quite probable that the degree of trade exposure has increased in the industries which we have defined as trade-sheltered. However, some of the decline is due to the contraction of trade-exposed industries, whether due to declining prices or output, thanks to overseas competition in both the export and domestic markets. This relative contraction of the trade-exposed industries has been balanced by relative expansion in the trade-sheltered industries. As explained above, such an expansion of trade-sheltered industries at the expense of trade-exposed industries is to be expected in a country which switches from a low to a high current account deficit by financing an increased proportion of its imports from overseas borrowing, this being a major element in the response to neo-liberal policy. The essential problem, as has been pointed out in past *State of the Regions* reports, is that a current account deficit as large as that run by Australia over the last three decades is unsustainable; sooner or later Australia will have to stop borrowing and therefore both to curb imports and increase export and/or import competing production.

We hasten to add that when all countries pursue current account surplus the result is depressed international demand and indeed recession. Australia would be well-served by an international agreement to expand global demand and, in particular, to expand it in countries which have need of Australian exports, such as the famine-struck countries of Africa. Sadly it has proved impossible to reach such an international agreement; indeed the various nations seem currently to be backing away from such cooperative good sense. Australia can argue for good sense but there's a practical limit to its capacity to boost world demand by running current account deficits.

Not all regions have shared in the general trend to depression in the trade-exposed industries. Between 1992 and 2016 the proportion of trade-exposed production in regional value added increased in four regions, in all four cases due to mining developments. In a further four mining-based regions the contribution of trade-exposed industry to value added stayed constant or fell slightly, but in two it fell significantly. These two were WA Peel SW and NT Lingiari, in both of which bauxite mining and processing is an important part of the mining industry. Bauxite and alumina production did not share in the mining boom.

In most of the agricultural regions, the proportion of trade-exposed industry in value added decreased by several percentage points. The most severe decreases were in Qld Darling Downs SW, Vic Loddon Mallee and the three Tasmanian regions, in all cases due to a combination of slow growth in agriculture and decline in food processing counterbalanced by increased production in trade-sheltered industries. In Qld Darling Downs SW these included mineral exploration (which may result in the region being reclassified to mining-based) while in Vic Loddon-Mallee they included finance (thanks to the Bendigo Bank).

Vic Gippsland is currently the most trade-exposed of the lifestyle regions. Its trade exposure lies in agriculture and gas. Value added in agriculture and food processing has been growing slowly and that in gas production has been declining so that the region is no longer a candidate for classification as mining-based or agriculture-based. A significant number of residents have transferred onto benefit payments, to which may be added retirement immigrants. The region has accordingly been reclassified as a lifestyle region. Something similar is happening in Tasmania North, in Qld Far North Torres and Qld Wide Bay Burnett, all of which retain significant but declining trade exposure thanks largely to their agricultural production (and in the Far North due to overseas tourism). The NSW lifestyle regions had low levels of trade exposure in 1992 and these levels have declined further.

Among the independent cities, Geelong experienced the largest decline in trade exposure, a decline which it shared with neighbouring outer Melbourne regions.

1.5 Conclusions

Australia is a trade-dependent country and all its regions are likewise trade-dependent. For most of its history Australia's governments, colonial then Commonwealth, state and territory, have made it their business to govern trade with the aim of maintaining and increasing prosperity. The instruments they have used have been based on the provision of a legal system conducive to the conduct of trade, but they have used many other instruments as well, including tax-financed education and other measures to promote equality of opportunity and in the process to ensure the best utilisation of the country's human resources. They have not been afraid to engage in public enterprise when private enterprise proved too timid or failed; they have not been afraid to direct the finance system so that investments considered essential to prosperity were made.

Over the past three decades the emphasis has been on the legal infrastructure of trade. Influenced by neo-liberal policies, including the advocacy of the Productivity Commission and its predecessors, governments have withdrawn from much of their formerly active pursuit of prosperity. In particular, they have yielded much of their authority over the distribution of resources to the finance sector, in the belief that market decisions and market incentives, conducted within a competitive framework, will maximise economic growth. In many ways the results have been satisfactory, but clear warning signals are now flashing red, particularly those associated with heavy loads of overseas and household debt. However profitable these are to the financial sector, they are not conducive to long-run growth. It is particularly worrying that Australia's trade-exposed industries are not, in general, as prosperous as its trade-sheltered industries, and there is a crying need to boost these industries – a boost which can only be given at the local and regional level.

Local government has all along played a humble but essential role in the economic system, even back in the days when some councils did not venture much beyond raising rates to finance roads and rubbish collections. These days are long past and most councils are now heavily involved in local economic development. An ideas paper issued by the Productivity Commission in April 2017 points out that there is a need for councils to shoulder an even more onerous responsibility, that of full participation with the Commonwealth and their state/territory government in the development and implementation of regional economic development strategies. Though the Commission emphasises the importance of local strategy, and has to this extent modified its view that market decisions should be paramount, it does not venture far into the question of the content of regional strategies, let alone the multi-billion-dollar question of their financing. The rest of this report concentrates on the issues to be covered in strategy plans. The Pillars of regional growth are here identified as a group of four drivers of productivity growth (skills formation, capital investment, knowledge-creation and the formation of supply chains). These pillars must be both founded and capped by policy to ensure that productive resources are fully utilised, region by region.

The reason for emphasising regional strategy is that both resources and opportunities vary markedly from region to region. In the following chapters we emphasise some of these differences. This should logically be followed by suggestions as to how the strategies should be financed, but this we leave to a later day – pointing out that several past *State of the Regions* reports have addressed this question, especially those for 2004-05 and 2012-13. As an aid to the description of regional differences, this chapter concluded with a revision of the classification of regions which has long featured in the *State of the Regions* reports.

To this end we begin with the truism that economic growth is founded on productivity increases. In the next chapter we pursue the drivers of productivity growth with a view to assisting regions to incorporate them into their development strategies.





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2. Raising incomes by raising productivity

The productivity of labour is conventionally defined as value added per hour worked. The greater the value of production per hour worked, the greater the amount available for distribution to the people who contribute to that value – working people of all grades of skill, managers, financiers and those who own the capital of business enterprises. It is axiomatic that productivity growth underlies income growth.

This chapter falls into two parts. The first part is devoted to the four pillars of productivity growth – skills, capital, knowledge-creation and supply-chain connectivity; the second to the proposition that productivity growth does not yield its full benefits until the additional output is sold. Productivity growth should accordingly be matched by growth in demand, which at the regional (and indeed national) level is a far from automatic process.

2.1 The drivers of productivity growth

The factors which contribute to productivity growth at the regional level may be identified by analysing the data on recent productivity growth across Australia's regions. The period considered is 1996 to 2016, two decades which include two booms: the urban land boom of the early 2000s and the mining boom which took off as the land boom subsided due to the Global Financial Crisis of 2008. The analysis is limited in two ways.

- It disregards the value remitted to corporate gross profits, for the simple reason that these cannot be readily allocated to regions. Corporate profits and depreciation allowances are generated across Australia by the operations of multi-regional businesses and are either allocated to the self-financed investment projects of the businesses which earned them or to payments by that business to those who financed the business, including lenders and shareholders. By contrast with these elements in value added, income generated by people who work for the business, including the 'mixed income' of local business owners who contribute their capital as well as their labour, are readily allocated to the regions in which the hours of work are performed. Productivity in this sense can readily be estimated at the regional level.
- It treats both hours worked and value added in agriculture and mining separately. This is not because productivity in these two major trade-exposed industries is unimportant far from it. In Chapter 3 we will emphasise that agriculture and mining are important as components of the economic base of all non-metropolitan regions, and indeed as components of the economic base of Australia as a whole. However, these two industries have distinctive characteristics which justify separate treatment.

The differences between agriculture and mining and all other industries arise mainly from their exposure to the weather and to commodity trade. Seasonal weather conditions can cause major changes in output, beyond the control of the producers, particularly in agriculture but also in mining, as when mines are flooded. Similarly, in that they both produce standard commodities which are traded on world markets subject to volatile prices, value added in agriculture and mining can change rapidly due to changes in international market conditions. Like the weather, these changes are beyond the control of the producers.

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Though we distinguish agriculture and mining as industries subject to the weather and to the fluctuations of commodity markets, other industries are also subject to these influences, though to lesser degree. For example, productivity in transport can be affected by adverse weather, and, more important, a wide range of industries beyond agriculture and mining are trade-exposed. These industries, including manufacturing, tourism and many other services, are like mining and agriculture in that they are affected by overseas competition and by fluctuations in exchange rates. However, their competitors' prices are a little more stable than those generated by international trade in minerals and agricultural commodities.

Similarly, there are agricultural products which are relatively sheltered from international commodity markets. In the days of slow transport most perishables were of this nature, and nowadays nichemarket agricultural products, with a core of loyal consumers, enjoy a measure of price stability akin to manufactured products. Again, many agricultural products are sold in manufactured form which tends to stabilise price while introducing middlemen between the farmer and the consumer. The same applies to mining products – metal ores are frequently smelted before sale. In this chapter we ignore these niceties and treat agriculture and mining as separate from other parts of the regional economy.

Income regionally captured per hour worked is subject to cyclical influences and to factors which affect the division of value added into corporate gross profits and regionally captured income. These factors will be discussed on an industry basis in Chapter 3. Here it suffices to note that income capture per hour worked will tend to be high in booming industries and regions and also in industries where lack of competition permits ballooning profits. To some extent the long time period under discussion serves to average out these effects, but the estimates are still sensitive to the time periods chosen.

More technically, here and there one may suspect that state effects affect the statistical estimates, in that unexpected differences occur between estimated productivity in regions of similar economic structure in different states. These differences may be real, or may result from estimation techniques, particularly the use of state control totals. Recent estimates of income captured per hour worked are generally higher for NSW, WA and perhaps the ACT and NT than they are for SA, Victoria and Queensland, and estimates for all these are higher than for Tasmania. Some of these differences may be cyclical, in that the mining boom was much more intense in WA than it was in Victoria or Tasmania.

Apart from these state effects, income regionally captured per hour worked in the non-agricultural, non-mining industries, averaged over the decade to 2016, was highest in the ACT followed by other core metropolitan regions. Within the metropolitan areas income captured per hour was higher in middle, high-status suburbs than in outer suburbs and was also quite high in the independent cities. Income capture was high in WA Pilbara Kimberley, the region at the centre of the mining boom, but shaded away to national average in other mining-based regions. It was generally below national average in the lifestyle and agriculture-based regions.

Growth in income capture between 1996 and 2016 was most rapid in metropolitan core regions (particularly Melbourne City and Perth Central) and in the mining-based regions producing iron ore or coal (particularly Qld Mackay and WA Pilbara Kimberley). The benefits of the mining boom were not shared by all mining-based regions; in particular the growth in income captured per hour worked was well below national average in WA Gascoyne Goldfields – the boom did not extend to gold or base metal mining. There was some spillover of productivity growth from the metropolitan core regions to the commuter suburbs but less to the independent cities, though NT Darwin reported impressive gains. Gains in the lifestyle regions were generally below average as were gains in most agriculture-based regions.

These were the overall trends. They will not necessarily continue following the end of the mining boom, nor are they inexorably beyond local influence. The rest of this chapter will be devoted to identifying intervention points where policy may help to raise regional productivity growth. As already stated, the analysis applies strictly to income captured per hour worked in industries other than mining and agriculture, but the policies advocated are relevant to all industries.

The analysis involves two concepts, potential productivity growth and realised growth. Potential is that growth which might be expected should a region's industries succeed in emulating best regional practice in utilising the resources available in their region in to reach state-of-the-art income capture rates per hour worked. Best regional practice is defined statistically with reference to highly-productive regions, which not only achieve high productivity industry by industry but which devote as many of their resources to high-productivity industries as is practicable given the pattern of demand for the region's potential products. Realised growth in general falls short of potential, and much of the value of the present analysis lies in identifying regions with significant shortfalls and asking why. By the same token, occasionally regions are identified which are achieving their potential or even outperforming potential as assessed.

The calculations were carried out on a LGA basis, with the drivers of productivity growth assessed on the assumption that each LGA can draw on its whole labour catchment when required. (For further discussion of labour catchments, see Chapter 4 on commuting.)

A number of factors contributed to potential productivity growth. All of them can be, to some degree, influenced by regional policy, but we will first list four where that influence is likely to be marginal.

- Productivity growth in agriculture has been due to the implementation of improved technologies as scientific knowledge is applied, equipment is replaced and the capital/worker and capital/land ratio is increased. Many of these increases are embodied in imported equipment, and some are affected by national and state policies. There are also regional influences, e.g. over such investments as irrigation and marketing. Though productivity growth in agriculture has been substantial, because the industry is now relatively small at national level, this accounted for less than 10 per cent of national gains in potential productivity from 1992 to 2016. Regionally, it contributed to productivity potential proportionally to the strength of rural industry in the regional economic base.
- Mining contributed likewise. Assessed by employment and hence by regional income capture, mining is a very small industry and directly contributed not much more than 1 per cent of the increase in regional potential productivity.
- In each industry, potential income grows due to technical change, much of which is incorporated into equipment and techniques as they are updated. This is a major source of productivity growth, accounting for 40 per cent of growth for Australia as a whole. Potential growth from this source was projected for each non-primary industry and allocated to each region according to industry prominence. The potential was greatest in metropolitan core regions, generally high in commuter regions and independent cities, somewhat less in lifestyle regions, somewhat less again in agriculture-based regions and least in mining-based regions.
- Population growth is for the most part a response to economic growth growing regions attract immigrants. There is, however, a feedback effect, since population growth raises productivity through economies of scale. Over the decade to 2016 this accounted for around 12 per cent of growth in potential income capture per hour worked, with the greatest gains in commuter regions, particularly around Perth.

Among these factors, the third (exogenous technical change) is by definition outside policy influence. Population growth, though identified as a separate factor, depends fundamentally on the success of the more direct drivers of productivity growth and can accordingly be treated as deriving from policies which affect these drivers rather than as a policy driver in its own right. This leaves agriculture and mining as policy areas.

The factors driving productivity in agriculture include all the four pillars identified with respect to industries in general and discussed below. They also include skill in managing the fluctuations of commodity prices and the natural hazards to which rural production is subject, including specialised financial and marketing arrangements.

2.2 Four pillars of productivity growth

We now turn to the four main pillars of productivity growth; those drivers which are most frequently identified as areas which should be addressed by regional development policy.

2.2.1 The skill base

Almost by definition, the more skilled the workforce, the higher will be productivity per hour worked. However, this depends on the existence of complementary capital equipment and also on there being markets for the products of labour and capital.

The skill base on which employers could draw to enhance productivity was derived from the proportion of the workforce within each labour catchment possessing skills defined as superior. The skills base reflects a combination of local educational effort and migration patterns and is also susceptible to technical change, since previously valuable skills can fall victim to technological progress. Local policy can affect skill availability both through education planning and through policy on the regional attraction of skilled migrants.

As measured, the skill base is relatively strong in the core metropolitan regions, and this strength spills into adjacent commuter regions but can become quite weak in the metropolitan outer suburbs. It is strong in Canberra and reasonably strong in the other independent cities. It appears to be very strong in WA Pilbara Kimberley, but this is probably a passing phase due to the mining boom; it is quite weak in the other mining-based regions where activity has settled down to routine operations. In the lifestyle regions it is generally a little below national average, but not much: these regions can parley their lifestyle advantages to attract skilled workers, provided there are jobs available. The only agriculture-based region where the skill base is as high as national average is WA Wheatbelt Great Southern, and this is probably a spillover from Perth. In all the other agriculture-based regions a below-average skill base is likely to hinder attempts to raise productivity.

Over the past quarter century the metropolitan core regions have mostly improved their skill advantages relative to the rest of the country, or at least avoided any major deterioration. The same is true of the commuter suburbs and independent cities. Trends in the mining-based regions have diverged, with WA Pilbara Kimberley improving its relative skill position and all the rest losing, some quite heavily. Similarly some lifestyle regions have maintained their position but others have lost some of their former skill advantages, notably Vic Gippsland. The relative skill position has deteriorated in all 14 agriculture-based regions, reflecting the difficulties of gaining an education in these regions and the lack of jobs attractive to skilled migrants or indeed to local young people trying to return after pursuing their education. The lack of skilled jobs is part of a vicious cycle – lack of jobs means lack of skilled personnel, and lack of skilled personnel contributes to low growth and hence reinforces the lack of skilled jobs.

Regional authorities drafting economic development strategies have considerable experience on which to draw – much of it sadly negative. Various recent experiences are detailed in Chapter 5.

2.2.2 Non-dwelling capital

Again almost by definition, the productivity of labour will be greater if people have appropriate capital available, including equipment, infrastructure and technologies; again provided that there is demand for their joint products.

The regional non-dwelling capital stock per person of workforce age helps to drive productivity growth through a simple mechanism: workers need capital to work with, so that the more capital is available per worker the higher labour productivity, provided both are fully employed. The regional capital stock combines capital owned by private businesses operating in the region with public capital vital to the provision of public services. NIEIR estimates the capital stock from data on regional capital accumulation (civil construction, construction of commercial buildings and purchase of equipment) combined with data on state-level capital accumulation.

In the quarter-century to 2016 the pattern of regional capital accumulation was strongly influenced by the mining boom, with major increases, relative to the country as a whole, in all nine miningbased regions, and also in Perth, Adelaide (less strongly) and NT Darwin. Brisbane also benefited from the mining boom, and capital accumulation proceeded at above the national average rate in SEQ Brisbane City and SEQ West Moreton but not in SEQ Moreton Bay, where workforce growth outran capital accumulation.

In the city centres and commuter suburbs of Sydney and Melbourne, and also in the ACT, the regional capital stock per capita grew at less than the national average rate. Investment in the major metropolitan areas failed to keep pace with growth in the working age population; in particular, lack of investment in transport has threatened urban cohesion including the ability of the city centre to draw employees from all over the metropolitan area. The relevant state governments appear to have realised this and all three are investing in mass transit systems, but whether this will suffice to head off a decline in productivity growth is yet to be seen. Since the capital cities are the locomotives of the knowledge economy such decline would have national effects.

Capital accumulation in the lifestyle regions proceeded at around the national average rate – some regions a little above, some a little below. The same applied in the agriculture-based regions.

As a result of these trends, in 2016 the highest levels of non-dwelling capital per resident of workforce age were found in the remote WA mining-based regions and the three Queensland mining-based regions – less so in NSW Inland Hunter and WA Peel SW. Capital per worker was well above national average in Perth but below in Adelaide and Melbourne, both for the core region and for the commuter suburbs. In Sydney and Brisbane capital availability was above average in the core metropolitan regions but lower in commuter suburbs. In the tourism-dependent lifestyle regions it was above average but in the benefit-dependent regions less so. Capital availability per worker was well below national average in some agriculture-based regions but above in others, in some cases (such as WA Wheatbelt Great Southern) due to the presence of non-agricultural industries.

Regional policy can affect the accumulation of non-dwelling capital through the allocation of public investments and public private partnerships. There is also a long tradition, recently somewhat in abeyance but quite possibly to be revived, of guiding the flow of purely private funds into investments crucial for regional development.

2.2.3 Knowledge-creation capacity

When a region pursues increases in productivity, it pays to have a concentration of knowledge-based employment within its labour catchment to support the attraction of high-productivity industries.

The location pattern of knowledge-creation capacity across the country tells a great deal about the requirements of the knowledge-based industries. Capacity is above national average (in the case of Sydney Metropolitan Core well above) in all the metropolitan core regions and in one or two of the independent cities, notably the ACT. It is also above national average in some commuter suburbs, but not in all – outer suburbs are at a distinct disadvantage. It is around or below national average in the lifestyle regions and well below national average in all nine mining-based regions. It is generally below national average in the agriculture-based regions.

Changes in the location of knowledge-creation capacity over the past quarter century have been moderate compared to changes affecting the other drivers of productivity. If anything Sydney has gained and Perth and Adelaide fallen behind.

State government policies on knowledge-creation have tended to accept present patterns and to concentrate on attracting knowledge industries into the state's capital city. Other regions considering emphasising this pillar should ensure that the particular knowledge activity targeted has viable prospects in their region, remembering that this is an area where lifestyle is an advantage but has to be complemented by accessibility, both physical transport and telecommunications.

2.2.4 Supply chain strength

When a region is pursuing productivity increases, it helps to have steady inter-business relationships both within the region and connecting the region and other regions. These assist both with the sourcing of inputs and the marketing of outputs.

Supply chain strength is measured by the intensity of inter-regional input-output relationships. In 2016 it was above national average in the core metropolitan regions of Perth (particularly), Sydney, Brisbane and Melbourne but below national average in Adelaide South. This appears to reflect connections between these city centres and the mining industry – supply chain strength was considerable in the remote WA mining-based regions but relatively weak in WA Peel SW, Qld Townsville NW and NSW Inland Hunter. It was weak in Tasmania, presumably due to the impediment of Bass Strait, and generally below average in the lifestyle and agriculture-based regions. Many of these patterns were of recent provenance and reflected the mining boom – over the 24 years to 2016 supply chains strengthened in most of the mining-based regions (the exceptions were NSW Inland Hunter and Qld Townsville NW). The most severe declines occurred in regions on the cusp of agriculture and lifestyle – Vic Gippsland and SA Fleurieu, but there were also declines in some of the commuter regions (particularly in Sydney) and in some of the agriculture-based regions.

There is less conventional wisdom concerning this pillar than the other three, which lays the field open for regions which can perceive opportunities – always remembering that untried developments are risky.

2.2.5 The four policy-related drivers together

The four pillars of regional productivity growth can be summarised by weighting them according to their average contribution to growth. The following results apply for 2016.

- In five of the six metropolitan core regions potential was above average.
- Commuter regions were generally near or below average.
- The independent cities were close to average, some above, some below.
- The mining-based regions ranged from well above (WA Pilbara Kimberley) to well below (NSW Inland Hunter it is likely that much of the impetus for productivity growth in NSW Inland Hunter is captured by Sydney and Coastal Hunter).
- Lifestyle regions were mostly below average.
- With the exception of WA Wheatbelt Great Southern, which was above average, the agriculture-based regions were average or below.

Over the past quarter century, the main regions to gain in the drivers of potential productivity growth were mining-based, while the main relative losses were in commuter suburbs and agriculture-based regions.

2.3 The effect of changes in the pillars of productivity growth

At the all-Australia level the skill base was a relatively small source of growth, accounting for around 4 per cent of potential. This driver was particularly important in Sydney Metropolitan Core and in the other inner Sydney regions, also in the ACT and most of Melbourne, having improved in all these regions over the decade to 2016. It was little lower in SEQ and definitely lower in Adelaide and Perth, in all of which it had been falling compared to national average. Among the independent cities it was high in NSW Illawarra but low in NT Darwin. It was also high in NSW South Coast and one or two other lifestyle regions, but low in other lifestyle regions and in agriculture-based and mining-based regions. The most severe falls relative to national average occurred in Qld Townsville NW and Vic Gippsland.

The regional non-dwelling capital stock per person of workforce age accounted for around 16 per cent of the increase in potential productivity in the decade to 2016. Growth was quite strong in the metropolitan regions and also in most of the mining-based regions; it tended to be weak in agriculture-based and lifestyle regions. Growth has recently been strong in the mining-based regions and also in Perth; it been weak in Melbourne and (particularly) Sydney and the ACT. Much of this growth was due to the response of mobile capital to perceived investment opportunities, hence the recent concentration on metropolitan and mining-based regions. However, the regional non-dwelling capital stock also increases when governments make infrastructure investment decisions and when local people re-invest in their region.

The concentration of knowledge-based employment within the labour catchment is as significant a driver of potential productivity as the non-dwelling capital stock, accounting for around 15 per cent of the increase in potential productivity Australia-wide. Regions well-endowed in this respect included the core metropolitan regions and the ACT – not so much the other independent cities. Commuter regions were less well-endowed except in Melbourne. Agriculture-based and mining-based regions were poorly endowed and falling further behind national average; lifestyle regions were also poorly endowed but some of them were moving towards national average. Knowledge-based employment tends to concentrate in places where personal contact can easily be maintained

between people with a wide variety of capabilities, not all of them necessarily well-paid (think of the contribution of the arts). Because of this, it is very difficult to decentralise the knowledge economy out of the metropolitan areas – and indeed it has often been pointed out that the major centres relevant to Australia are not in Australia itself but are overseas, as in the concentration of entertainment and finance in places like New York and of manufacturing expertise increasingly in Guangzhou, China. However, improvements in telecommunications and in regional transport have allowed some knowledge-based employment to decentralise, particularly to lifestyle regions.

During the mining boom it was helpful for a region to have supply-chain relationships with the mining industry, but more generally supply chains tend to be strong in metropolitan core regions and quite strong in commuter suburbs. They have been weak in regions such as Vic Gippsland where unrelated industries share geographic space. It is in this respect that regional planning can be helpful in identifying weak links in local supply chains and either working round them or mending them, including arranging the necessary finance.

2.4 Regional growth in potential productivity

Taking the four policy-influenced drivers together with the four which are not under direct policy influence, the growth rate of potential productivity across all Australia 1992-2016 is estimated at 1.55 per cent a year, roughly equally divided between the four drivers here defined as under policy influence and the four which are not. Potential growth was distributed as follows.

- In the core metropolitan regions, it was below national average in Adelaide South, close to average in the two Sydney core metropolitan regions and above average in Perth, Melbourne and Brisbane.
- Not surprisingly, potential in the commuter suburbs tended to reflect potential in the core of their metropolitan area. In Sydney and Melbourne potential in the outer suburbs tended to be lower than in the inner suburbs, though Outer Northern Melbourne was an exception to this generalisation.
- Potential again varied between the independent cities, being well above national average in NT Darwin, around average in the ACT and below average in Coastal Hunter.
- Potential was high in the booming mining-based regions (WA Pilbara Kimberley, Qld Mackay) but lower in mining-based regions with weak supply chains (NSW Inland Hunter) or specialisation in non-booming minerals (Qld Townsville NW, SA Far North and West, WA Gascoyne Goldfields).
- Potential ranged widely in the lifestyle regions, from very low in Vic Gippsland to rather high in SEQ Sunshine Coast. The low growth rate in Vic Gippsland was due to factors beyond regional control, namely the decline in gas production and the beginnings of withdrawal from coalbased electricity generation.
- In the agriculture-based regions potential again ranged widely, from well below national average in most of NSW and the adjacent Victorian regions to quite high in WA Wheatbelt Great Southern – this latter due, perhaps, to developments in industries other than agriculture.

It is all very well to have potential, but various factors can prevent the realisation of potential. We have estimated the growth rate of potential productivity from 1992 to 2016 at 1.55 per cent a year, but Australia-wide the realised growth rate was 1.38 per cent, a shortfall of 0.17 per cent a year.

Table 2.1 Drivers of LGA total productivity growth (GRP per hour worked), 1996 to 2016 (percentage point contribution)												
	Drivers of non-primary product productivity change											
SOR16	Agriculture sector	Mining sector	Underlying (manna from heaven)	Catchment skills	Catchment capital stock – per working age population	Knowledge creation workers	Catchment supply chain strength	Agriculture gross product in catchment	Mining catchment gross product per capita of working age population	Indirect impact on productivity from population growth	Local area efficiency	Total productivity change
Sydney Metropolitan Core	0.2	-0.1	16.7	2.5	7.3	9.5	7.5	0.2	-0.9	3.2	-6.8	39.3
Sydney Eastern Shores	0.3	0.0	16.8	2.0	5.8	5.4	5.6	0.3	-0.3	3.1	-7.3	31.6
Sydney Mid West	0.2	0.1	15.7	2.0	4.8	4.9	3.9	0.2	-0.2	3.0	-10.5	23.8
Sydney Near West	0.2	0.0	16.8	1.8	3.6	2.2	3.6	0.5	-0.9	3.7	-1.7	29.8
Sydney Outer Northern Shores	0.8	0.0	17.0	2.0	5.4	5.7	5.2	0.2	-0.8	3.9	-11.9	27.3
Sydney Outer South West	1.3	0.3	16.1	1.3	1.3	0.2	0.6	0.4	-0.5	5.5	-9.1	17.3
Sydney Outer West	1.2	0.5	16.6	1.4	3.9	3.1	2.6	-0.2	-0.5	4.5	-16.2	16.9
Sydney Parramatta Ryde	0.3	0.0	18.3	2.4	5.4	4.9	4.9	0.2	-0.3	5.0	-0.3	40.8
Sydney South East	0.1	0.0	16.8	2.5	7.3	10.2	7.3	0.3	-0.9	3.2	-27.4	19.4
NSW Central Coast	1.1	0.4	16.5	1.5	2.5	3.7	1.8	0.5	-0.9	2.8	-22.8	7.0
NSW Central West	7.1	-0.1	13.1	1.0	1.8	0.3	1.8	0.1	-0.7	3.6	-8.5	19.6
NSW Coastal Hunter	0.5	1.4	15.8	1.8	4.9	5.8	3.7	0.3	-0.7	2.6	-17.3	18.8
NSW Illawarra	0.6	3.2	16.0	2.5	7.8	10.8	7.8	0.2	-0.7	3.4	-31.2	20.5
NSW Inland Hunter	4.8	2.0	13.8	0.9	3.1	0.2	3.3	0.2	-0.6	2.5	-10.1	20.2
NSW Murray Far West	5.9	2.3	13.6	0.7	3.1	2.6	1.8	0.3	-1.6	1.1	-15.8	14.1
NSW Murrumbidgee	7.5	1.0	14.8	1.0	4.0	3.2	3.3	0.3	-0.4	2.0	-27.3	9.5
NSW North Coast	4.2	2.4	15.7	0.9	4.1	4.3	2.9	0.6	-1.3	2.3	-16.8	19.3
NSW Northern Inland	9.3	2.1	13.9	1.1	3.9	4.5	4.0	0.4	-0.6	1.3	-26.6	13.2
NSW Northern Rivers	5.4	6.7	15.6	1.8	5.1	6.8	5.2	0.1	-0.6	4.5	-35.0	15.6
NSW Orana	7.0	4.1	12.9	0.8	3.2	3.6	2.1	-0.1	-0.8	2.3	-20.1	15.1
NSW Southern Tablelands	9.4	5.1	15.1	1.4	4.2	5.0	4.1	0.4	-0.5	2.7	-24.2	22.6
NSW South Coast	3.8	4.9	15.9	2.3	6.9	9.5	6.9	0.4	-0.7	3.4	-41.9	11.4
Melbourne City	0.2	-0.5	16.5	2.2	8.5	7.1	8.9	0.8	0.9	4.9	9.7	59.2
Melbourne Eastern Inner	0.3	-0.1	16.7	2.2	8.4	7.7	8.7	0.5	1.3	4.3	-2.5	47.7

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Table 2.1 Drivers of LGA total productivity growth (GRP per hour worked), 1996 to 2016 (percentage point contribution) – continued												
	Drivers of non-primary product productivity change											
SOR16	Agriculture sector	Mining sector	Underlying (manna from heaven)	Catchment skills	Catchment capital stock – per working age population	Knowledge creation workers	Catchment supply chain strength	Agriculture gross product in catchment	Mining catchment gross product per capita of working age population	Indirect impact on productivity from population growth	Local area efficiency	Total productivity change
Melbourne Eastern Outer	2.8	0.1	16.3	2.1	7.7	6.9	8.0	0.4	1.4	3.6	-14.5	34.8
Melbourne Northern Inner	0.3	-0.2	16.7	2.2	8.9	7.9	9.3	0.8	0.7	4.6	-3.6	47.7
Melbourne Northern Outer	1.7	0.1	16.5	2.2	9.3	8.0	9.8	0.8	0.4	5.0	-14.0	39.8
Melbourne Southern Inner	0.6	0.0	16.7	2.2	8.1	7.2	8.4	0.7	1.4	4.4	-10.6	39.0
Melbourne Southern Outer	4.7	0.5	16.0	1.3	3.5	1.5	2.6	0.0	2.2	5.2	-6.6	30.7
Melbourne Western	0.8	0.1	16.6	2.0	7.4	4.9	7.9	0.5	0.6	7.1	-13.5	34.5
VIC Geelong	1.6	-0.4	16.3	2.0	7.2	4.4	7.7	0.3	0.4	7.6	-19.0	28.0
VIC Gippsland	10.0	-11.2	10.9	-0.1	2.5	0.4	1.0	0.2	0.7	2.0	-0.4	16.0
VIC Grampians	9.6	1.3	13.7	0.9	4.4	3.9	4.5	0.2	-0.1	3.9	-17.0	25.3
VIC Hume	9.3	2.6	14.2	1.0	3.7	3.4	3.0	0.3	-1.6	2.2	-17.3	20.7
VIC Loddon Mallee	7.1	1.6	14.1	0.6	4.2	4.7	3.8	0.1	-0.9	2.6	-12.8	25.1
VIC South West	12.2	0.9	12.7	0.6	4.2	4.9	3.6	0.2	-0.1	1.8	-15.4	25.6
SEQ Brisbane City	0.5	-1.0	16.4	2.1	7.9	8.7	9.5	0.2	-0.3	7.3	-6.9	44.3
SEQ Gold Coast	0.8	0.7	16.5	1.8	6.0	6.9	6.7	-0.1	-0.3	8.6	-3.6	43.9
SEQ West Moreton	7.8	0.2	15.4	1.7	6.6	6.8	7.6	0.2	-0.2	6.6	-4.9	47.6
SEQ Logan Redland	2.5	-0.5	16.3	1.4	4.7	4.8	4.8	0.7	0.2	6.0	-10.1	30.8
SEQ Moreton Bay	3.2	0.2	16.2	0.9	3.8	2.2	4.2	-0.4	-0.1	9.4	0.7	40.2
SEQ Sunshine Coast	4.7	1.5	16.1	1.1	6.3	12.8	5.9	0.1	-1.2	6.1	-15.9	37.4
QLD Darling Downs South West	13.3	-1.8	13.8	0.5	5.3	5.1	5.5	0.5	-1.2	2.7	-1.1	42.5
QLD Far North Torres	8.5	0.7	14.9	0.8	5.0	9.7	5.0	0.2	-0.9	5.0	-11.2	37.7
QLD Fitzroy Central West	6.4	4.6	13.7	0.7	5.4	9.0	6.5	0.2	-0.9	3.7	-3.9	45.4
QLD Mackay	7.8	9.0	12.4	0.6	5.2	8.0	5.3	0.0	-1.1	4.9	6.4	58.5
QLD Townsville North West	4.4	3.4	13.9	-0.1	3.3	1.2	3.8	0.3	0.0	4.9	3.8	38.9
QLD Wide Bay Burnett	13.4	0.8	14.5	0.6	4.5	4.8	3.8	0.3	-0.6	3.3	-2.6	42.8

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Table 2.1Drivers of LGA	Table 2.1 Drivers of LGA total productivity growth (GRP per hour worked), 1996 to 2016 (percentage point contribution) – continued											
		Drivers of non-primary product productivity change										
SOR16	Agriculture sector	Mining sector	Underlying (manna from heaven)	Catchment skills	Catchment capital stock – per working age population	Knowledge creation workers	Catchment supply chain strength	Agriculture gross product in catchment	Mining catchment gross product per capita of working age population	Indirect impact on productivity from population growth	Local area efficiency	Total productivity change
Adelaide South	3.1	-0.2	16.5	1.1	4.8	-0.6	4.4	1.0	-0.3	2.4	12.5	44.6
Adelaide North	3.2	-0.1	16.5	1.2	5.7	-1.3	3.7	1.2	-0.5	2.5	12.6	44.9
SA East	32.1	0.0	12.7	0.7	2.3	-0.3	2.1	0.7	-0.1	1.7	-28.3	23.7
SA Far North and West	19.1	1.5	12.2	0.8	1.6	-1.0	2.0	1.0	-0.4	1.3	-7.1	31.3
SA Fleurieu	25.4	4.9	14.2	0.8	3.1	-1.3	3.2	0.9	-0.5	2.6	-11.0	42.3
SA North	28.1	0.1	13.5	0.5	2.2	-0.6	2.8	0.9	0.1	2.0	-24.8	24.8
Perth Central	1.6	-0.9	16.2	1.2	8.0	5.1	11.9	0.2	-1.0	5.9	7.2	55.5
Perth Outer North	5.1	-0.9	16.1	1.0	6.1	2.3	6.6	0.2	-0.6	8.7	3.4	47.9
Perth Outer South	4.9	-0.4	16.2	0.5	5.4	0.7	7.1	0.3	-0.4	10.1	-0.2	44.1
WA Gascoyne Goldfields	9.0	1.2	6.6	0.1	1.9	-0.1	2.8	0.2	-0.1	1.6	0.2	23.4
WA Peel South West	17.2	2.7	13.7	0.7	4.4	1.3	7.1	0.2	-1.2	9.0	-16.8	38.2
WA Pilbara Kimberley	2.1	63.6	6.2	0.7	2.8	0.2	3.6	0.2	-0.3	3.1	-26.9	55.2
WA Wheatbelt Great Southern	31.9	-0.6	11.7	0.2	4.3	1.2	5.4	0.4	-0.6	4.0	-19.5	38.3
TAS Hobart South	10.9	1.0	14.9	1.9	5.2	5.2	4.4	0.7	2.4	1.4	-14.9	33.2
TAS North	11.6	-0.7	14.4	0.7	4.5	-1.3	3.8	0.6	0.3	0.6	-5.0	29.5
TAS North West	12.3	-0.8	12.3	0.2	3.4	-0.7	2.2	0.6	0.1	0.3	-8.9	21.0
NT Darwin	-0.3	3.2	15.6	0.9	12.0	7.3	12.3	-0.1	-1.8	7.0	0.7	56.8
NT Lingiari	-1.2	2.4	10.9	0.7	4.9	5.2	5.0	0.0	0.7	2.8	0.7	32.3
ACT	0.1	0.0	16.8	2.4	6.8	4.5	7.5	0.6	0.5	3.3	-4.2	38.3
Australia	2.4	0.5	15.9	1.7	6.4	6.0	6.7	0.3	-0.2	4.8	-5.7	38.9

Source: Derived at LGA level and aggregated into SOR regions using working age population as weights.



Figure 2.3: Total gross income from economic activity \$'000 per capita of working age population in 2014-15 prices – 2016 (per cent deviation from national average) versus Local area catchment productivity growth drivers (per cent deviation from national availability average)



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2.5 Realised productivity growth 1992-2016

In most regions, the actual gain in regional income per hour worked from 1992 to 2016 was less than potential. Australia-wide the shortfall was approximately 13 per cent, with pronounced regional differences as follows.

- Three metropolitan core regions (Adelaide South, Melbourne and Perth) performed better than their potential as assessed; Sydney Parramatta Ryde performed almost exactly to potential and Sydney Metropolitan Core and SEQ Brisbane fell below potential by around 13 per cent. Among these regions, Adelaide and Parramatta Ryde performed particularly well during the mining boom, during which performance in Perth and Melbourne tended to decline.
- Two commuter suburbs, Perth Outer North and Adelaide North, exceeded potential, raising questions as to whether their potential had been underestimated. Among commuter suburbs, the most serious shortfalls occurred in Sydney Outer West, Sydney Mid West, Sydney Outer South West and Sydney South East, which once hosted manufacturing industries which were more productive than average even if they were not equal to overseas competition. The contraction of these industries without replacement by the diversion of resources to equally-productive alternative employment resulted in disappointing productivity performance. During the mining boom there was some evidence of productivity recovery in the west of Sydney; less so in the Melbourne suburbs where manufacturing industry was more at risk from the overvaluation of the exchange rate during the mining boom.
- One independent city, Darwin, met expectations; one, the ACT, fell behind at about the national average rate, and the rest (Vic Geelong, NSW Illawarra, NSW Central Coast and NSW Coastal Hunter) fell behind seriously, again due to the contraction of manufacturing without replacement at similar levels of productivity. These trends continued through the mining boom.
- All the lifestyle regions failed to reach their potential. Of the eight regions, Vic Gippsland managed well during the early 2000s but fell short thereafter. SEQ Gold Coast also fell behind by a fairly small margin, but NSW South Coast and NSW Northern Rivers fell way short and showed no signs of recovery during the mining boom. The lifestyle regions are oriented towards low-productivity population-serving industries and the main export industry of many of them, tourism, also generates low levels of income per hour worked and accordingly has limited ability to translate local growth potential into productivity gains. Those lifestyle regions which approached potential were either, like Gippsland, assessed as having low potential, or, like Gold Coast, diversifying away from the typical lifestyle industry structure towards independent city status.
- Performance in the mining-based regions was balanced between meeting or exceeding potential (four regions) and failing to meet potential (five regions). This reflected a mixture of the performance of the particular mining industries concerned and the performance of the non-mining elements in each region's economy. Productivity performance tended to deteriorate during the mining boom. The reasons for this have frequently been canvassed, of which pressing marginal mines into service during the boom and increased expenditure on mine maintenance and development, unrelated to production, are the most commonly mentioned.

All the agricultural regions fell behind potential, though the fall in Qld Darling Downs SW was relatively small, perhaps due to the region's nascent mining industry. Otherwise the agriculture-based regions have failed to achieve productivity growth other than that which arises due to improvements in agricultural techniques and other technical changes incorporated into new equipment as it replaces old. Though these regions are assessed as having potential for growth from capital investment, improved skills and the like, it has been difficult to realise this potential and so far success has been limited. For these regions the only effective regional development policies would aim to utilise the resources available while providing complementary new resources to improve productivity performance. The strategy for each region would be highly specific and be based on a combination of local knowledge of resources available with broader knowledge of available markets. In these regions, the broadbrush approach wastes resources. Without a consistent plan, simply increasing the quantum of regional potential, would simply be offset by increases in local area inefficiencies.

Skills, non-dwelling capital stock, knowledge-creativity and supply chain connectivity should all be addressed in any regional strategy and constitute four pillars of regional economic development. However, there is a fifth pillar – markets, both domestic and overseas. To this we now turn.

2.6 Productivity growth

So far this chapter has covered four pillars of productivity growth identified from the supply side and concluded that realised growth frequently falls short of potential growth. One of the major reasons for such shortfalls is insufficiency of demand. A major hazard of a concentration on productivity increases is that they mean that a given level of production can be sustained with less labour. If substitute jobs are not found for the displaced workers, there are two unwanted results:

- the resulting increase in incomes is offset by a decline in resource utilization; and
- the increase in incomes is concentrated on those who provide capital and those who remain in employment, thus generating an increase in inequality.

This hazard can be avoided if the extra capacity created by productivity growth is utilised to increase export production, hence the need for a careful assessment of export market prospects as part of regional strategy construction.

Within a region, it may also be proposed that the additional demand necessary to employ the addition to capacity can be created by increasing the demand for high-value locally-produced goods and services. The labour rendered surplus by the productivity growth will then be re-deployed into other industries which will employ them at similar levels of productivity to their previous employment. However, the scope for doing this is limited for two reasons.

- Not all the income resulting from the increase in productivity will be received within the region.
- Not all of this will be spent within the region. Some of the additional income will be hoarded (not spent at all, either on consumption or on capital goods); or spent on imports, or spent on low-productivity services. (In this last case, resource utilisation will be maintained but the redeployment of workers to low-productivity activities will offset the original productivity increase and also contribute to an increase in inequality.)

In the rest of this chapter we deal with such increases in domestic demand as may confidently be included in regional strategies. It will be noted that these calculations are 'Keynesian' in nature, in that they do not assume that supply automatically creates its own demand. They turn the analysis of the previous section on its head and ask whether a productivity increase will generate sufficient extra demand to maintain a given level of employment level or economic activity, and also addresses the related question as to whether, after taking into account the dynamics of demand supply interaction, productivity growth increases income inequality between Australian regions.

The analysis is inevitably somewhat abstract, since it involves macroeconomics, but will be familiar to local economic development planners from their discussions of multiplier effects. In order to do it properly we need a detailed integrated model of the regional economies as well as realistic input assumptions that will drive the model responses.

2.6.1 The industry assumptions

The key assumptions which drive the analysis are at the two digit ANZSIC industry level. The analysis was undertaken in terms of average annual growth rates over the decade ending in 2016. It is accordingly specified as 'what if' variations on the experience of the last decade.

The average annual productivity growth rate over the decade is given for the two digit National industries in column 1 of Table 2.2. Productivity is measured as real gross product at factor cost, which is equivalent to real value added per hour worked. The reported growth rates are the average of the 2006 and 2016 compound annual growth rates and the time coefficients of the log linear equations estimated from the data. Lower bound estimates were imposed on the rate of productivity growth. The overall national rate of growth over the decade was 1.8 per cent per annum.

Value added is distributed between households, governments and business through wages, profit retention and various other channels. During the decade, average annual income from work (wages, salaries and mixed income) was c_{VM} 855 billion. If productivity growth was spontaneous and due to 'manna from heaven' (that is, it did not result from any increase in inputs of capital, skills etc.) and the only factor input impacted was labour input measured in man-hours, a 1.8 per cent annual productivity growth rate would have generated total annual industry cost savings of c_{CVM} 15.4 billion. The demand impact on the economy of this productivity growth will depend on how the \$15.4 billion was distributed as income and on the expenditure changes which resulted from these income changes.

The immediate effect of the increase in productivity is that hours worked fall and the workers who would have worked those hours lose \$15.4 billion in income. The corresponding immediate gains can be claimed by a number of groups. The first possible claimant group is those workers who remain in employment as a result of the productivity increase. Their likely share can be estimated using simple log linear trend equations in which the dependent variable is the real wage rate (in \$cvm per hour worked) and the independent variables are industry productivity and time. In column 2 of Table 2.2 the estimated response of the real wage rate to productivity increases is provided by industry, calculated on an Australia-wide basis over the past decade. The weighted average across industries is that a 1 per cent increase in productivity generates a 0.67 per cent increase in real wages, so that the wage share of value added falls. At the macroeconomic level, this echoes the fall in the wage share of GDP which has characterised the last couple of decades. A falling wage share is not a necessary accompaniment of increasing productivity - in times past there have been periods when rising productivity has been accompanied by a rising wage share. Explanations for the recent tendency of the wage share of income to fall when productivity increases have ranged from technological developments to institutional changes including the decline of the trade unions and the dismemberment of the arbitration system.

Whatever has been driving the fall in the wage share of income, it is a fact of the past decade which has to be factored into any analysis of the fruits of productivity gains. We accordingly focus is on the first-order responses of income changes to productivity growth as reported in column two of Table 2.2. At the national level, two-thirds of the c_{VM} 15.4 billion will flow directly into income increases for those workers retain in employment. This means that \$4.9 billion will be retained by enterprises.

The next issue is how much of this \$4.9 billion initially gained by enterprises will be used to reduce prices. It is commonly assumed that competition will ensure that the whole lot will be distributed this way, but in practice businesses are often in a position to corner a little extra profit. Estimates of the extent to which they have done so over the past decade are reported in the third column of Table 2.2, which gives the trend percentage increase in the gross profit share in value added for a one per cent increase in productivity. Using these data it is simple to calculate how the \$4.9 billion will be shared between price reductions and distributions to equity holders. We estimate that the funds allocated to price reduction would be sufficient to reduce the gross domestic product deflator by 0.1 per cent. This price effect would increase real disposable incomes. (Those industries where the word 'residual' is entered in the third column of the table are industries where prices are fully determined by export prices. In these industries all productivity gains flow into gross surplus and hence benefit equity holders).

The final industry-level assessment required concerns the proportion of equity returns that accrues to foreign owners. The assumptions here are given in the last column of the table. It is estimated that the marginal share (the share to be applied to increases in surplus due to increases in productivity) will be greater than the average share on the basis that foreign-owned enterprises will, more often than not, have productivity higher than industry average. According to these assumptions, at the all-Australia level, 34 per cent of the increase in surplus after corporate taxes 34 per cent will be allocated to foreign equity holders.

After allowing for reduction in gross profits because of price reductions the total direct amount left over to be distributed from the c_{CVM} 4.9 billion is c_{CVM} 2.8 billion. Of this, c_{CVM} 0.8 billion will go to the Commonwealth government as corporate income tax, c_{CVM} 0.7 billion will actually or potentially be distributed as income to foreign holders of Australian equity assets and the residual c_{CVM} 1.3 billion is available for distribution to domestic equity holders. The sums available for distribution to equity holders will not necessarily be distributed, though over the last couple of decades shareholder activism combined with a subdued demand outlook has resulted in an increase in the proportion distributed and reduction in the proportion retained for re-investment in business.

This sets the stage for a multiplier analysis of employment and income gains as the various direct beneficiaries of the productivity increase spend their gains. To answer the questions posed at the beginning of this section it is necessary to carry out the estimations at the regional level, beginning with the regional implications of the direct allocation of the gains from productivity change which we have just described at the national level.

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2.6.2 The modelling system

In order to evaluate the impact on productivity growth rates at the regional level and integrated econometric model is required. We use NIEIR's LGA-based modelling system.

NIEIR has built up a considerable body of intellectual capital for more than 25 years. A major part of this capital is NIEIR's IMP modelling suite, a range of powerful forecasting and analysis tools which give NIEIR "leading edge" capability in national, state, regional and local area economic and business analysis. Other formal models include:

- detailed industry modelling with forecasting sectors (86 industry sectors);
- regional models and forecasting covering all regions in Australia down to the LGA level based on the 86 industry input-output structure;
- models projecting equity market performance indicators at the industry level;
- national and State quarterly, medium and long term models producing forecasts from 6 quarters to 40 years ahead;
- an energy sector model with greenhouse impact and electricity load curve projection capability;
- international and trade models;
- economic activity "leading indicator" models; and
- microsimulation models for assessing household level economic activity and the distributional consequences of short term policy changes, and local area consumer demands down to groups of 200 to 300 households.

Over the last 20 years NIEIR has developed an extensive regional data base. At the core of the data base is the quarterly Local Government Area (LGA) data base with consistent series from the June quarter 1991 to June Quarter 2017. The data base is uses the 86 industry 2-digit ANZSIC industry classification for 567 LGAs with each industry having time series indicators for:

- hours of work by place of work and place of residence;
- dollar per hour by place of work and place of residence;
- employment by place of work and place of residence;
- sales;
- value added;
- inter-regional and international exports;
- inter-regional and international imports;
- consumption expenditures by industry by households in an LGA; and
- final demand estimates for equipment investment, construction and current government expenditures.

Household income and expenditures by LGA are structured in accordance with the National and State Household Income Formation table in the Australian Bureau of Statistics' Australian National Accounts.

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The NIEIR LGA data bases are available in the public domain on ID-supported websites for nearly 200 LGAs. Summary data is also available at the 67 regional level in Appendix 1 of this report.

Over the last two years annual data bases have been developed with many of the LGA series broken down into estimates from 2001 to 2016 for the SA2 region level and for employment by place of work and place of resident employment at the 1-digit ANZSIC industry level at the SA1 level.

The data bases have been used to construct a powerful quarterly integrated LGA regional modelling system based around:

- automatically updated input-output relationships for each LGA;
- inter-regional trade flow relationships between a given industry in a given LGA and all other LGAs in Australia; and
- investment formation and capacity expansion functions estimated for historical data for installed floor space capacity, infrastructure capital stock estimates and major individual investments time series.

The inter-regional trade flows between and within LGAs by industry are constrained to the relevant cell from the estimated quarterly updated (to 2015.2 and projected from that date) 2-digit ANZSIC national direct allocation of imports input-output table estimates. For projecting the national trade flow constraints for intra and inter-regional trade flows the key national drivers are industry technological trends (digital disruption, etc.) final demand formation (consumption, investment built up from the regional level) and behavioural functions for international import penetration by 2-digit industry.

The allocation of international and inter-regional imports by industry to LGAs is based on allocation rules to maintain local and global demand/supply balance.

International exports by industry are projected from the local area based on national competitive drivers (the exchange rate) and local competitiveness indicators (based on productivity, industry cluster density, labour market scale, scope and skill density, etc.) of the LGA region. A major additional driver of projected export capacity expansion in tradable-goods industries is the identification potential major projects by scale and location that are "triggered" when appropriate by changes in the economic environment over the next three decades.

The causal relationships in the model are graphed in Figure 2.4.



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2.6.3 NIEIR's industry structure

Table 2.2	2 Industry structure		
ANZSIC 2-digit number	Industry	ANZSIC 2-digit number	Industry
1	Agriculture	44	Accommodation
2	Aquaculture	45	Food and Beverage Services
3	Forestry and Logging	46	Road Transport
4	Fishing, Hunting and Trapping	47	Rail Transport
5	Agriculture, Forestry and Fishing Support Services	48	Water Transport
6	Coal Mining	49	Air and Space Transport
7	Oil and Gas Extraction	50	Other Transport
8	Metal Ore Mining	51	Postal and Courier Pick-up and Delivery Services
9	Non-Metallic Mineral Mining and Quarrying	52	Transport Support Services
10	Exploration and Other Mining Support Services	53	Warehousing and Storage Services
11	Food Product Manufacturing	54	Publishing (except Internet and Music Publishing)
12	Beverage and Tobacco Product Manufacturing	55	Motion Picture and Sound Recording Activities
13	Textile, Leather, Clothing and Footwear Manufacturing	56	Broadcasting (except Internet)
14	Wood Product Manufacturing	57	Internet Publishing and Broadcasting
15	Pulp, Paper and Converted Paper Product Manufacturing	58	Telecommunications Services
16	Printing (including the Reproduction of Recorded Media)	59	Internet Service Providers, Web Search Portals and Data Processing Services
17	Petroleum and Coal Product Manufacturing	60	Library and Other Information Services
18	Basic Chemical and Chemical Product Manufacturing	62	Finance
19	Polymer Product and Rubber Product Manufacturing	63	Insurance and Superannuation Funds
20	Non-Metallic Mineral Product Manufacturing	64	Auxiliary Finance and Insurance Services
21	Primary Metal and Metal Product Manufacturing	66	Rental and Hiring Services (except Real Estate)
22	Fabricated Metal Product Manufacturing	67	Property Operators and Real Estate Services
23	Transport Equipment Manufacturing	69	Professional, Scientific and Technical Services (Except Computer System Design and Related Services)
24	Machinery and Equipment Manufacturing	70	Computer System Design and Related Services
25	Furniture and Other Manufacturing	72	Administrative Services
26	Electricity Supply	73	Building Cleaning, Pest Control and Other Support Services
27	Gas Supply	75	Public Administration
28	Water Supply, Sewerage and Drainage Services	76	Defence
29	Waste Collection, Treatment and Disposal Services	77	Public Order, Safety and Regulatory Services
30	Building Construction	80	Preschool and School Education
31	Heavy and Civil Engineering Construction	81	Tertiary Education
32	Construction Services	82	Adult, Community and Other Education

Table 2.2	2 Industry structure (continued)						
ANZSIC 2-digit number	Industry	ANZSIC 2-digit number	Industry				
33	Basic Material Wholesaling	84	Hospitals				
34	Machinery and Equipment Wholesaling	85	Medical and Other Health Care Services				
35	Motor Vehicle and Motor Vehicle Parts Wholesaling	86	Residential Care Services				
36	Grocery, Liquor and Tobacco Product Wholesaling	87	Social Assistance Services				
37	Other Goods Wholesaling	89	Heritage Activities				
38	Commission-Based Wholesaling	90	Creative and Performing Arts Activities				
39	Motor Vehicle and Motor Vehicle Parts Retailing	91	Sports and Recreation Activities				
40	Fuel Retailing	92	Gambling Activities				
41	Food Retailing	94	Repair and Maintenance				
42	Other Store-Based Retailing	95	Personal and Other Services				
43	Non-Store Retailing and Retail Commission Based Buying	96	Private Households Employing Staff and Undifferentiated Goods-				

2.7 Scenarios for the distribution of benefits from productivity increases

In the following analysis the base case for Australia and for each region is what actually happened in the decade from 2006 to 2016. Since the question concerns whether productivity increases enhance income in the absence of increased exports (or increased import substitution), international exports and the relationship between imports and incomes are the same in all cases. Three variant cases are considered, which differ in the assumptions made about how the productivity increase is distributed across regions.

Case one

In Case one it is assumed that all industries in all regions experience the same productivity increases. The factors which determine the distribution of the gains to the various claimants are laid out in Table 2.3 and for each industry are assumed to be constant across the 67 regions. The results in Table 2.4 show the changes to incomes and employment compared to the base case, as estimated by the model after the increases in income have been spent, including multiplier effects. The multiplier effects are dampened, as always in Keynesian analysis, by:

- the overseas share of the income increase, which is assumed not to be spent anywhere in Australia;
- expenditure by domestic income recipients on imports; and
- increases in domestic savings, so that the income is not spent.

In these scenarios multiplier effects are dampened by two further assumptions.

- All additional income accruing to equity holders is paid out; there is no corporate retention and no counterpart business-sector purchases of capital goods.
- All additional income accruing to the government is saved.

Thanks to the diversion of income gains to overseas incomes and saving, the multiplier effects of the assumed productivity gain fail to raise spending sufficiently to maintain the levels of employment observed in the base case. The impact across Australia is the loss of 24 net annual hours worked per capita of the working age population which translates into an employment loss of 12 per thousand of the working age population. This loss is spread across all regions. On a place-of-work basis the heaviest losses are in the metropolitan core regions. This is associated with the importance of finance as an employer in these regions. Finance is a high-productivity industry (at least as productivity was measured in the decade to 2016) and a further increase in its productivity involves loss of hours worked, in part balanced by increased remuneration for those who remain in work, much of which is drawn from other regions by transfers within the finance sector – hence increases in average income from work. In similar fashion hours of work fall but income from work rises in the most productive of the mining regions. The regions least affected by falls in hours worked on a place of work basis are those characterised by low-productivity, trade-sheltered industries - lifestyle regions and outer suburbs. However, in the metropolitan areas and also in the FIFO regions regional distinctions on a place-of-work basis are spread around by commuting. As a result the residents of some metropolitan outer suburbs, particularly in Sydney, lose well above the average hours worked.

Across Australia average net real income loss from work is c_{CVM} 665 a year per capita of the working age population, though this excludes the real price effect which raises real household disposable income thanks to the devotion of some of the additional surplus to price reductions. Income from work rises in the centres of Sydney and Melbourne thanks to the high propensity of financial sector to capture real income gains from productivity increases.

Increases in domestic capital incomes due to the productivity gains are distributed to regions in proportion to their net capital income. These benefit all regions and partially offset the losses in work incomes.

The average loss in real disposable income per capita of the working age population is c_{CVM} 353 while the loss in gross product is c_{CVM} 212. The decline in real gross product is less than that in real disposable income due to the increase in the amount remitted overseas and to the increase in the amount saved by governments. It is instructive to note that the largest reductions in GRP per capita occur in the metropolitan core regions, precisely the regions favoured by increases in income, highlighting the expertise of the finance sector in capturing income from productivity gains from all over the country.

By contrast, the public sector has no such expertise – the ACT loses both GRP and income from the productivity increase, though not by much The most intriguing case is that of the Tasmanian regions, which in Case 1 lose GRP, but not by as much as most regions, and come very close to maintaining income. This could be due to low levels of diversion of productivity gain to overseas and to saving.

It should be noted that these results continue to apply, though not quite so strongly, if the whole of the increase in productivity is captured by those who remain at work. For sure, this helps to maintain regional demand, but it does not increase it sufficiently to maintain capacity utilisation.

Even if the productivity increases at a similar rate in all industries, as in this case, there will be (at a minimum) an increase in absolute inequality between regions, and there may be an increase in relative inequality, as would happen when the residents of the poorer regions spend their increased income on services provided by the richer regions – financial services, for example.

Case two

Case two is the same as Case one save that the exogenous productivity growth rates are differentiated by region, as follows.

- In each industry 40 per cent of productivity change due to technological factors at the national level applies in that industry in all regions.
- The remaining 60 per cent of national productivity cost savings are allocated on the basis of each region's capacity to grow local productivity in accordance with its endowments of the four productivity growth drivers evaluated in the first part of this chapter. If a region is 50 per cent or more below the national average for the weighted productivity growth drivers per capital of working age population it receives no more productivity growth than its allocation of 40 per cent of national productivity growth for each industry. After that its ability to capture national industry productivity growth depends on its relative endowments of the four local productivity growth drivers. The distribution of the productivity gains to a region for a given industry is constrained to the same aggregate productivity gain as applied in Case one.

In general, from Table 2.5, the poorer regions less real disposable income than in Case one. The lower productivity growth rates for these regions mean that less hours and income are lost, with multiplier effects. In the metropolitan regions the increased productivity growth rate across the metropolitan area as a whole cushions the impact of the higher employment losses so that in general net hours lost is less than in Case one. Also the metropolitan regions, and in particular the inner metropolitan regions, benefit from the reduced loss of economic activity in the nonmetropolitan regions. Essentially the pattern of loss is similar to Case one but less marked, with two exceptions – the scenario is unfavourable to the outer regions of Perth, perhaps because it is less kind to source regions for FIFO employment.

Case three

Case three allows for some of the unspent savings to be redirected to expand capacity (in old-fashioned Keynesian language for an accelerator effect). The capacity expansion effect was estimated for each of the 86 industries across the 536 Australian LGAs. The key independent variables as far as analysis here was industry productivity relative to the national average, which, to take care of non-linear relationships, was also entered into the estimating equations squared. These equations were used to estimate the capacity expansion effect for an industry in a given region given the increase in productivity for each industry based on the inputs used in Case two.

By contrast with the other two scenarios, this scenario generated a gain in GDP at the national level, though there was still a loss in household disposable income due to the diversion of the benefits of productivity gain to profits directed overseas and taxes left unspent by governments. GRP increased modestly in most regions, the main losers being the Outer Perth regions, again probably related to their links to the mining boom. Gains were still concentrated in the metropolitan core regions, particularly Sydney, Melbourne and Perth.

Judged by the change to household disposable income, most regions were again better off than in Case two, though not always compared to the base case. The outer commuter suburbs tended to lose income and the typical agriculture-based region suffered a small loss.

Policy implications

These model dynamics capture a process which has been under way for several decades both in Australia and overseas. Metropolitan core regions, their residents and their workers, have been gaining increasing shares of national income while regions distanced from the metropolitan centres or based on manufacturing activity have suffered significant declines in relative real incomes. The gap will widen even if productivity growth within each industry is distributed evenly across the regions because the central metropolitan areas host high productivity industries and therefore a given percentage productivity change will deliver relatively large absolute gains on real income compared to the more distant regions. If this simple arithmetic is allowed to continue it will lead to extreme political instability, as the world political events of 2016 portend.

At present there is no sign that the trend will be arrested, since high productivity growth generates high gross internal cash flow, permitting the high productivity industries of the metropolitan core regions to invest in the growth drivers thereby further increase the productivity and real income differentials between the core metropolitan regions and other regions.

The only long-term solution is to supercharge the drivers of local area productivity change in regions which are currently at a disadvantage. But to do this resources have to be mobilised, in the first instance by governments and then by the private sector leveraging off the initial government investments. But as can be seen from the tables governments are net losers from the natural consequences of productivity change both in terms of direct and indirect taxes. The only solution is starkly evident by the results of Table 2.5. To keep governments solvent and capable of performing their essential role in economic development it will be necessary to increase the proportion of value added harvested in tax, for example by significantly higher marginal direct tax rates, so a greater percentage of the income gains in the core metropolitan regions will flow into the government pool from which they can be redistributed to the lagging regions, firstly as direct compensation for income loss but more important for investment in the drivers of local area productivity growth.

Again, it is important to remember that the Australian economy is bound by its imports, its exports and its overseas debt to the economies of the rest of the world. Over the past three decades it has depended far more than is sustainable on the accumulation of debt, both household debt and overseas debt. We shall see in Chapter 4 that this has depressed the trade-exposed industries and regions relative to the trade-sheltered industries and regions, and particularly the core metropolitan regions. It will be important to address this imbalance both at national level and as regional development strategies are prepared.

Table 2.3 Productivity distribution	analysis: Indu	stry assumptions			
	Last decade average annual productivity growth rate	Elasticity of real direct worker income in \$/hour with respect to productivity growth	Elasticity of gross profit share in value added with respect to productivity growth	Downward impact on output prices – per cent of value added (%)	Marginal foreign ownership ratio with respect to income (ratio)
Agriculture	3.08	0.47	residual	0.00	0.38
Aquaculture	0.50	0.20	residual	0.00	0.50
Forestry and Logging	5.63	1.00	residual	0.00	0.25
Fishing, Hunting and Trapping	4.89	1.00	residual	0.00	0.25
Agriculture, Forestry and Fishing Support					
Services	0.50	1.00	3.0	-0.01	0.25
Coal Mining	0.50	0.30	residual	0.00	0.65
Oil and Gas Extraction	0.50	0.32	residual	0.00	0.80
Metal Ore Mining	1.18	0.20	residual	0.00	0.75
Non-Metallic Mineral Mining and Quarrying	5.43	0.53	0.1	-0.87	0.25
Exploration and Other Mining Support Services	0.50	0.77	3.0	0.00	0.25
Food Product Manufacturing	0.50	0.33	1.5	0.00	0.80
Beverage and Tobacco Product Manufacturing	0.50	0.70	1.1	0.00	0.80
Textile, Leather, Clothing and Footwear Manufacturing	1.86	1.00	0.0	-0.03	0.63
Wood Product Manufacturing	1.63	1.00	0.2	0.00	0.38
Pulp, Paper and Converted Paper Product Manufacturing	4.14	0.50	0.0	-1.36	0.80
Printing (including the Reproduction of Recorded Media)	3.55	1.00	0.0	-0.08	0.50
Petroleum and Coal Product Manufacturing	0.50	1.00	0.2	0.00	0.80
Basic Chemical and Chemical Product Manufacturing	0.50	1.00	0.0	0.00	0.80
Polymer Product and Rubber Product Manufacturing	1.21	0.95	0.4	0.00	0.80
Non-Metallic Mineral Product Manufacturing	2.56	0.99	2.4	0.00	0.55
Primary Metal and Metal Product Manufacturing	1.93	0.63	2.4	-0.74	0.80
Fabricated Metal Product Manufacturing	2.83	1.00	0.0	-0.06	0.63
Transport Equipment Manufacturing	2.35	1.00	3.0	0.00	0.80
Machinery and Equipment Manufacturing	2.00	0.81	0.0	-0.27	0.80
Furniture and Other Manufacturing	0.50	0.93	0.0	-0.04	0.38
Electricity Supply	0.50	0.47	0.0	-0.07	0.60
Gas Supply	0.50	0.29	2.3	0.00	0.60
Water Supply, Sewerage and Drainage Services	0.50	0.41	0.7	0.00	0.13
Waste Collection, Treatment and Disposal				-	
Services	1.93	0.22	0.0	-1.12	0.00
Building Construction	0.50	0.44	2.7	0.00	0.13
Heavy and Civil Engineering Construction	4.26	1.00	0.0	-0.08	0.38
Construction Services	1.09	0.87	0.0	-0.13	0.13

Table 2.3 Productivity distribution	Table 2.3Productivity distribution analysis: Industry assumptions (continued)											
	Last decade average annual productivity growth rate	Elasticity of real direct worker income in \$/hour with respect to productivity growth	Elasticity of gross profit share in value added with respect to productivity growth	Downward impact on output prices – per cent of value added (%)	Marginal foreign ownership ratio with respect to income (ratio)							
Basic Material Wholesaling	4.08	0.48	2.9	0.00	0.75							
Machinery and Equipment Wholesaling	3.33	1.00	0.4	0.00	0.75							
Motor Vehicle and Motor Vehicle Parts Wholesaling	2.94	0.46	1.0	-0.83	0.75							
Grocery, Liquor and Tobacco Product												
Wholesaling	1.74	0.20	2.1	0.00	0.75							
Other Goods Wholesaling	3.89	0.95	0.0	-0.29	0.75							
Commission-Based Wholesaling	6.44	0.31	2.2	-2.36	0.75							
Motor Vehicle and Motor Vehicle Parts		1.00	2.0	0.00	0.75							
	4.01	1.00	3.0	0.00	0.75							
	5.14	0.65	1.0	0.00	0.25							
Food Retailing	0.84	0.39	3.0	0.00	0.25							
Other Store-Based Retailing	3.04	0.53	0.4	-0.59	0.25							
Based Buying and/or Selling	10.22	0.36	3.0	-4.04	0.50							
Accommodation	2.18	0.20	2.3	0.00	0.38							
Food and Beverage Services	0.50	0.20	2.7	0.00	0.25							
Road Transport	2.19	1.00	1.5	0.00	0.50							
Rail Transport	0.50	0.72	0.8	0.00	0.25							
Water Transport	5.43	1.00	0.5	0.00	0.80							
Air and Space Transport	2.69	0.45	2.1	0.00	0.68							
Other Transport	6.70	0.88	0.0	-0.48	0.25							
Postal and Courier Pick-up and Delivery Services	0.50	0.81	2.5	-0.15	0.13							
Transport Support Services	5.28	0.81	1.6	0.00	0.38							
Warehousing and Storage Services	0.50	0.53	1.6	0.00	0.25							
Publishing (except Internet and Music Publishing)	2.49	0.20	1.0	0.00	0.25							
Motion Picture and Sound Recording Activities	1.48	1.00	3.0	0.00	0.63							
Broadcasting (except Internet)	5.96	1.00	0.6	0.00	0.38							
Internet Publishing and Broadcasting	0.50	0.73	0.8	0.00	0.50							
Telecommunications Services	6.61	1.00	1.8	0.00	0.38							
Internet Service Providers, Web Search												
Portals and Data Processing Services	5.61	0.85	0.2	0.00	0.50							
Library and Other Information Services	0.50	0.42	1.2	0.00	0.13							
Finance	3.38	0.83	1.6	0.00	0.50							
Insurance and Superannuation Funds	3.44	0.97	2.1	0.00	0.40							
Auxiliary Finance and Insurance Services	3.29	0.76	3.0	-0.58	0.45							
Kental and Hiring Services (except Real Estate)	3.30	0.60	3.0	-4.05	0.13							
Property Operators and Real Estate Services	0.50	0.20	0.2	-0.05	0.13							

Table 2.3 Productivity distribution	analysis: Indu	stry assumptions	(continued)		
	Last decade average annual productivity growth rate	Elasticity of real direct worker income in \$/hour with respect to productivity growth	Elasticity of gross profit share in value added with respect to productivity growth	Downward impact on output prices – per cent of value added (%)	Marginal foreign ownership ratio with respect to income (ratio)
Professional, Scientific and Technical Services					
(except Computer System Design and	0.50	0.01		0.04	0.20
Related Services)	0.50	0.91	0.0	-0.04	0.38
Services	1 07	0.37	3.0	0.00	0.50
Administrative Services	1.28	0.80	3.0	-0.30	0.13
Building Cleaning, Pest Control and Other					
Support Services	0.50	0.20	3.0	-0.59	0.13
Public Administration	0.56	0.20	3.0	-0.05	0.00
Defence	1.84	0.20	3.0	0.00	0.00
Public Order, Safety and Regulatory Services	0.58	1.00	3.0	0.00	0.00
Preschool and School Education	0.64	1.00	3.0	0.00	0.00
Tertiary Education	0.50	1.00	0.0	0.00	0.08
Adult, Community and Other Education	0.50	1.00	0.0	0.00	0.00
Hospitals	1.43	0.50	3.0	0.00	0.05
Medical and Other Health Care Services	0.50	1.00	0.0	0.00	0.03
Residential Care Services	3.83	0.77	3.0	0.00	0.08
Social Assistance Services	1.84	0.32	3.0	0.00	0.00
Heritage Activities	0.50	0.74	1.6	0.00	0.00
Creative and Performing Arts Activities	4.29	1.00	0.8	-0.15	0.13
Sports and Recreation Activities	0.50	1.00	0.3	0.00	0.13
Gambling Activities	7.06	0.59	2.7	0.00	0.13
Repair and Maintenance	0.50	0.89	3.0	0.00	0.05
Personal Care and Other Services	2.33	0.20	0.0	-1.85	0.03
Private Households Employing Staff and Undifferentiated Goods and Service- Producing Activities of Households for Own Use	0.50	0.95	0.0	-0.02	0.00
Total	1.84	0.69		-0.11	0.34

Table 2.4 Case one impact)	: Uniform	productivity	y change for a g	iven industry a	across the	regions (a	average annı	ıal		
	Hours pe work populat	er capita of ing age ion ('000)	Number per capita of working age population	\$ _{CVM} per capita of working age population						
SOR name	Industry total hours worked	Resident total hours worked	Resident employment	Resident income from work	Capital income	Tax paid	Household disposable income	Gross regional product		
Sydney Metropolitan Core	-91.8	-27.0	-14.0	2847.4	139.7	1008.0	2068.7	-665.0		
Sydney Eastern Shores	-21.8	-26.3	-13.8	-741.2	148.9	-237.5	-270.9	-97.3		
Sydney Mid West	-18.9	-22.4	-11.6	-832.7	73.7	-179.2	-527.0	-207.7		
Sydney Near West	-19.6	-27.3	-14.3	-560.6	119.1	-139.8	-220.5	-200.0		
Sydney Outer Northern Shores	-18.7	-29.5	-14.3	-1849.5	150.7	-537.1	-1067.1	-354.1		
Sydney Outer South West	-17.4	-25.4	-12.3	-1176.1	68.9	-248.7	-800.0	-321.0		
Sydney Outer West	-21.2	-28.6	-12.9	-2014.2	73.1	-438.0	-1440.7	-415.4		
Sydney Parramatta Ryde	-33.0	-25.0	-13.4	-190.2	102.0	-19.7	1.4	-283.6		
Sydney South East	-17.4	-31.0	-14.9	-2399.9	117.3	-646.5	-1560.7	-363.8		
NSW Central Coast	-15.4	-21.7	-11.7	-941.2	106.1	-207.9	-538.1	-173.6		
NSW Central West	-23.2	-23.1	-11.7	-371.9	88.5	-69.3	-127.2	-102.4		
NSW Coastal Hunter	-20.5	-19.9	-10.8	-503.7	103.6	-103.3	-203.8	-114.8		
NSW Illawarra	-17.1	-20.8	-11.1	-811.7	96.2	-183.5	-437.0	-174.3		
NSW Inland Hunter	-17.9	-19.5	-10.3	-412.9	85.9	-80.1	-164.1	-92.0		
NSW Murray Far West	-24.4	-24.2	-11.4	-360.1	82.4	-66.3	-129.7	-109.5		
NSW Murrumbidgee	-24.7	-24.6	-12.1	-444.5	83.4	-84.7	-198.4	-120.4		
NSW North Coast	-17.5	-17.9	-10.9	-312.0	108.0	-49.4	-66.3	-57.6		
NSW Northern Inland	-25.2	-25.2	-12.0	-414.1	88.2	-76.7	-164.4	-107.6		
NSW Northern Rivers	-17.2	-18.4	-9.9	-321.1	97.4	-55.1	-87.7	-76.0		
NSW Orana	-24.9	-24.9	-11.9	-416.4	93.3	-79.5	-155.2	-110.0		
NSW Southern Tablelands	-18.9	-23.0	-11.6	-477.6	103.4	-94.1	-183.2	-103.9		
NSW South Coast	-17.1	-17.9	-9.9	-370.6	104.1	-62.6	-117.3	-77.0		
Melbourne City	-145.3	-15.3	-9.7	4890.0	69.5	1656.5	3358.1	-602.8		
Melbourne Eastern Inner	-24.1	-23.5	-12.6	-315.4	118.9	-65.7	-63.0	-142.0		
Melbourne Eastern Outer	-18.9	-27.8	-13.3	-975.6	87.6	-217.0	-599.9	-275.0		
Melbourne Northern Inner	-18.2	-22.5	-12.0	-437.6	84.9	-79.0	-200.8	-136.5		
Melbourne Northern Outer	-20.5	-22.7	-12.4	-678.6	64.8	-143.7	-410.5	-209.3		
Melbourne Southern Inner	-24.4	-23.7	-12.6	-222.6	116.9	-36.6	4.5	-103.0		
Melbourne Southern Outer	-13.2	-23.6	-12.6	-1139.8	75.1	-249.0	-742.3	-166.4		
Melbourne Western	-16.9	-23.6	-13.0	-706.1	72.0	-145.4	-427.0	-205.4		
VIC Geelong	-19.8	-21.6	-10.6	-1069.9	83.6	-249.3	-661.8	-250.6		
VIC Gippsland	-21.7	-22.2	-11.1	-379.2	89.0	-69.4	-145.4	-117.6		
VIC Grampians	-20.3	-23.4	-11.7	-500.3	79.0	-99.4	-250.1	-157.6		
VIC Hume	-21.7	-23.6	-12.6	-424.7	81.5	-77.5	-190.2	-119.6		
VIC Loddon Mallee	-21.4	-23.7	-11.7	-588.1	84.7	-119.2	-306.6	-157.4		
VIC South West	-24.9	-26.4	-13.0	-446.2	93.9	-81.6	-183.5	-128.4		

Table 2.4 Case one impact) -	Table 2.4 Case one: Uniform productivity change for a given industry across the regions (average annual impact) – continued								
	Hours pe work populat	r capita of ing age ion ('000)	Number per capita of working age population	\$сум	per capita d	of working a	age populatio	n	
SOR name	Industry total hours worked	Resident total hours worked	Resident employment	Resident income from work	Capital income	Tax paid	Household disposable income	Gross regional product	
SEQ Brisbane City	-30.5	-22.0	-11.8	-772.6	138.4	-194.0	-354.9	-194.9	
SEQ Gold Coast	-21.2	-22.7	-12.0	-813.6	89.9	-185.8	-454.9	-176.0	
SEQ West Moreton	-15.1	-20.6	-11.2	-364.8	75.9	-65.7	-171.8	-90.5	
SEQ Logan Redland	-13.8	-22.8	-11.2	-589.0	63.0	-119.5	-351.0	-144.1	
SEQ Moreton Bay	-15.3	-24.8	-12.1	-855.5	71.7	-182.6	-536.6	-356.3	
SEQ Sunshine Coast	-19.7	-21.8	-11.6	-771.3	97.8	-164.8	-413.8	-232.2	
QLD Darling Downs South West	-27.0	-26.3	-12.9	-359.0	73.2	-66.3	-148.8	-118.4	
QLD Far North Torres	-24.7	-25.0	-11.4	-956.6	67.2	-199.6	-634.0	-278.4	
QLD Fitzroy Central West	-23.9	-23.2	-11.8	-346.6	82.4	-70.3	-116.1	-97.8	
QLD Mackay	-26.7	-25.1	-12.1	-404.6	80.0	-82.4	-160.3	-109.8	
QLD Townsville North West	-25.6	-25.5	-11.2	-805.0	61.3	-176.9	-507.3	-280.0	
QLD Wide Bay Burnett	-19.1	-19.9	-10.3	-301.0	79.8	-47.8	-115.0	-86.4	
Adelaide South	-28.7	-22.8	-11.7	-515.8	98.9	-56.8	-287.6	-297.9	
Adelaide North	-18.2	-21.5	-12.0	-729.7	74.0	-143.4	-454.5	-160.8	
SA East	-26.8	-26.8	-13.3	-368.5	94.0	-57.5	-142.0	-124.9	
SA Far North and West	-23.3	-21.7	-11.5	-357.5	82.9	-68.2	-126.6	-114.8	
SA Fleurieu	-14.5	-22.6	-12.2	-678.2	99.6	-151.0	-342.4	-150.3	
SA North	-19.5	-23.4	-12.4	-387.8	84.7	-66.5	-163.8	-92.2	
Perth Central	-41.3	-24.0	-11.9	-337.6	120.1	-45.5	-90.2	-418.2	
Perth Outer North	-17.4	-26.9	-13.0	-1907.3	83.6	-501.6	-1247.5	-398.0	
Perth Outer South	-14.6	-24.3	-12.3	-1546.6	89.6	-404.7	-980.7	-219.8	
WA Gascoyne Goldfields	-21.0	-18.7	-9.4	-341.4	88.1	-67.0	-112.4	-88.9	
WA Peel South West	-18.0	-20.7	-11.2	-658.1	92.2	-159.7	-326.4	-143.0	
WA Pilbara Kimberley	-38.0	-24.7	-12.4	442.3	89.1	166.0	454.8	-130.1	
WA Wheatbelt Great Southern	-28.3	-29.6	-12.8	-462.4	95.5	-85.0	-198.5	-131.9	
TAS Hobart South	-19.4	-19.4	-11.7	-224.0	93.1	-22.2	-40.0	-66.8	
TAS North	-21.3	-21.5	-11.8	-372.6	86.3	-68.1	-152.8	-92.3	
TAS North West	-20.0	-19.9	-11.3	-149.1	87.9	-12.9	21.5	-66.3	
NT Darwin	-24.9	-26.5	-12.9	-1181.5	133.3	-269.7	-688.9	-185.8	
NT Lingiari	-21.7	-18.3	-9.0	-179.6	71.4	-26.5	-19.1	-71.6	
ACT	-18.1	-16.4	-9.8	-771.0	325.4	-89.0	-214.5	-49.0	
Australia	-23.6	-23.6	-12.2	-665.1	99.1	-137.5	-353.1	-211.7	

Case two: Differential productivity change for a given industry across regions in accordance with the endowments of productivity growth drivers (average annual impact)

	Hours pe	er capita of	Number per capita of					
	work	ing age	working age					
	populat	ion ('000)	population	\$сум	per capita o	of working a	age populatio	n
	Industry	Resident		Resident			Household	Gross
	hours	hours	Resident	income	Capital		disposable	regional
SOR name	worked	worked	employment	from work	income	Tax paid	income	product
Sydney Metropolitan Core	-82.4	-22.9	-12.2	2758.9	129.0	969.8	2007.8	-344.5
Sydney Eastern Shores	-15.1	-21.2	-11.3	-698.0	137.5	-219.5	-257.1	-58.1
Sydney Mid West	-12.9	-16.3	-8.5	-642.2	68.0	-135.6	-385.8	-150.9
Sydney Near West	-12.6	-21.8	-11.6	-574.2	110.0	-147.0	-236.1	-153.1
Sydney Outer Northern	12.7	22.2	10.9	1/65 2	120 1	120.2	011.2	ר בדר
Shores	-12.7	-22.2	-10.8	-1405.5	139.1	-420.5	-811.3	-272.2
Sydney Outer South West	-9.7	-10.5	-7.9	-831.4	03.0	-172.4	-530.9	-217.7
Sydney Outer West	-13.3	-19.4	-8.7	-1406.3	67.5	-301.7	-974.7	-281.7
Sydney Parramatta Ryde	-25.0	-19.2	-10.5	-115.7	94.1	-2.2	50.5	-187.2
Sydney South East	-13.6	-24.6	-12.0	-1917.7	108.3	-512.1	-1221.8	-278.0
NSW Central Coast	-10.1	-15.0	-8.1	-669.9	98.0	-142.7	-340.2	-111.8
NSW Central West	-15.4	-15.3	-7.6	-241.9	81.7	-39.0	-34.3	-61.9
NSW Coastal Hunter	-14.2	-13.6	-7.4	-329.4	95.6	-58.3	-82.5	-/1.2
NSW Illawarra	-14.8	-17.6	-9.6	-6/1.3	88.8	-149.2	-338.3	-132.4
NSW Inland Hunter	-11.4	-13.0	-6.8	-313.8	79.4	-57.6	-93.9	-61.8
NSW Murray Far West	-16.6	-16.4	-7.5	-234.1	/6.1	-37.2	-39.1	-66.9
NSW Murrumbidgee	-18.1	-18.1	-8.8	-304.1	77.0	-52.4	-96.7	-80.9
NSW North Coast	-10.5	-10.8	-6.7	-180.6	99.7	-19.6	26.9	-22.9
NSW Northern Inland	-20.4	-20.3	-9.6	-323.4	81.5	-56.8	-100.3	-75.4
NSW Northern Rivers	-12.7	-13.6	-7.4	-230.1	89.9	-33.9	-25.4	-44.1
NSW Orana	-18.6	-18.7	-8.8	-301.5	86.1	-53.6	-73.4	-73.9
NSW Southern Tablelands	-14.4	-17.1	-8.7	-332.1	95.5	-58.9	-80.9	-60.5
NSW South Coast	-14.8	-15.3	-8.6	-312.6	96.1	-50.9	-79.0	-55.9
Melbourne City	-105.0	-11.1	-7.2	3582.4	64.1	1218.0	2483.7	-276.8
Melbourne Eastern Inner	-17.0	-16.7	-9.0	-217.4	109.8	-36.6	-3.3	-88.1
Melbourne Eastern Outer	-12.9	-19.2	-9.3	-670.2	80.9	-144.0	-374.1	-178.9
Melbourne Northern Inner	-13.2	-16.4	-8.8	-309.7	78.4	-50.5	-108.0	-84.4
Melbourne Northern Outer	-15.7	-16.8	-9.4	-475.3	59.8	-97.3	-258.6	-137.2
Melbourne Southern Inner	-17.2	-16.9	-9.0	-158.1	107.9	-16.5	39.8	-62.7
Melbourne Southern Outer	-7.1	-14.7	-7.8	-742.0	69.3	-156.6	-442.6	-99.5
Melbourne Western	-12.3	-17.1	-9.6	-502.7	66.5	-99.5	-275.0	-135.0
VIC Geelong	-13.8	-15.2	-7.5	-740.2	77.2	-167.6	-420.3	-164.6
VIC Gippsland	-14.2	-14.6	-7.1	-252.5	82.1	-40.7	-54.2	-74.2
VIC Grampians	-12.7	-14.9	-7.2	-320.7	72.9	-57.9	-117.9	-92.5
VIC Hume	-14.2	-15.6	-8.2	-283.8	75.2	-47.1	-86.0	-74.0
VIC Loddon Mallee	-13.6	-15.4	-7.4	-383.8	78.2	-72.7	-155.4	-94.7
VIC South West	-17.2	-18.5	-8.7	-336.6	86.7	-57.3	-105.4	-92.1

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Case two: Differential productivity change for a given industry across regions in accordance with the endowments of productivity growth drivers (average annual impact) – continued

	Hours pe work	er capita of ing age ion ((000)	Number per capita of working age	ć	por conito d	ofworking	ago populatio	
SOR name	Industry total hours worked	Resident total hours worked	Resident	Resident income from work	Capital	Tax paid	Household disposable income	Gross regional product
SEO Brishane City	-25.2	-17.7	-9.6	-594.3	127.8	-142.7	-238.5	-136.7
SEQ Brisbane City	-13.9	-15.1	-8.1	-549.4	83.0	-119.7	-263.7	-111 5
SEQ West Moreton	-11.6	-15.9	-8.7	-283.0	70.1	-48.5	-113.0	-64.3
SEQ Logan Redland	-7.3	-15.9	-7.7	-467.4	58.2	-92.9	-260.8	-105.3
SEQ Moreton Bay	-7.9	-16.5	-7.9	-645.0	66.2	-134.8	-379.3	-251.9
SEO Sunshine Coast	-12.0	-13.7	-7.4	-499.3	90.3	-100.0	-214.1	-131.8
QLD Darling Downs South West	-19.7	-19.3	-9.3	-253.5	67.6	-43.1	-72.1	-83.3
QLD Far North Torres	-16.6	-17.1	-7.6	-651.9	62.0	-132.5	-401.6	-189.6
QLD Fitzroy Central West	-21.3	-20.6	-10.5	-287.1	76.1	-56.7	-76.5	-80.9
QLD Mackay	-22.1	-20.2	-9.7	-287.4	73.8	-52.9	-78.7	-82.7
QLD Townsville North West	-19.6	-19.5	-8.6	-605.8	56.6	-130.8	-359.0	-210.0
QLD Wide Bay Burnett	-11.9	-12.7	-6.4	-196.1	73.7	-26.4	-37.7	-53.7
Adelaide South	-49.5	-30.9	-16.4	-179.8	91.3	77.7	-93.7	-292.0
Adelaide North	-11.3	-25.3	-14.0	-1116.9	68.3	-234.5	-756.2	-239.7
SA East	-22.0	-22.5	-10.7	-335.6	86.8	-50.1	-123.7	-109.3
SA Far North and West	-27.7	-23.7	-11.8	-418.0	76.6	-94.9	-166.9	-121.0
SA Fleurieu	-13.4	-26.2	-13.9	-915.9	92.0	-217.2	-521.5	-218.4
SA North	-13.5	-18.0	-9.1	-337.4	78.2	-56.8	-129.7	-81.5
Perth Central	-122.1	-62.3	-30.9	-89.0	110.9	120.7	-17.0	-1017.9
Perth Outer North	-20.1	-54.7	-24.8	-4590.3	77.2	-1242.2	-3196.3	-972.9
Perth Outer South	-14.4	-42.3	-20.0	-3147.1	82.7	-860.1	-2132.7	-485.6
WA Gascoyne Goldfields	-20.9	-18.3	-8.9	-295.6	81.3	-57.8	-82.6	-106.1
WA Peel South West	-15.4	-20.9	-10.3	-800.8	85.1	-203.5	-432.4	-207.9
WA Pilbara Kimberley	-41.7	-27.6	-13.7	515.1	82.2	184.3	502.5	-122.1
WA Wheatbelt Great Southern	-28.7	-30.9	-12.3	-535.9	88.2	-105.1	-259.2	-214.6
TAS Hobart South	-12.2	-12.3	-7.4	-137.4	85.9	-6.3	23.5	-35.1
TAS North	-12.0	-12.2	-6.5	-210.1	79.7	-30.9	-34.1	-51.6
TAS North West	-11.8	-11.7	-6.5	-99.1	81.2	-3.4	55.2	-48.1
NT Darwin	-21.7	-25.1	-12.0	-1210.5	123.0	-279.7	-718.0	-188.5
NT Lingiari	-21.1	-15.2	-7.3	48.9	65.9	19.9	157.5	-52.5
ACT	-13.2	-12.1	-7.4	-569.4	300.4	-53.7	-73.2	-22.5
Australia	-20.9	-20.9	-10.6	-631.7	91.5	-130.8	-334.0	-199.0

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Case three: Differential productivity change for a given industry across regions in accordance with the endowments of productivity growth drivers with capacity expansion (average annual impact)

			Number per					
	Hours pe	er capita of	capita of					
	work	ing age	working age					
	populat	ion ('000)	population	\$ сум	per capita o	of working a	age populatio	n
	total	Kesident		Resident			Household	Gross
	hours	hours	Resident	income	Capital		disposable	regional
SOR name	worked	worked	employment	from work	income	Tax paid	income	product
Sydney Metropolitan Core	-82.4	-22.9	-12.2	2758.9	129.0	969.8	2007.8	-344.5
Sydney Eastern Shores	-15.1	-21.2	-11.3	-698.0	137.5	-219.5	-257.1	-58.1
Sydney Mid West	-12.9	-16.3	-8.5	-642.2	68.0	-135.6	-385.8	-150.9
Sydney Near West	-12.6	-21.8	-11.6	-574.2	110.0	-147.0	-236.1	-153.1
Sydney Outer Northern								
Shores	-12.7	-22.2	-10.8	-1465.3	139.1	-420.3	-811.3	-272.2
Sydney Outer South West	-9.7	-16.5	-7.9	-831.4	63.6	-172.4	-536.9	-217.7
Sydney Outer West	-13.3	-19.4	-8.7	-1406.3	67.5	-301.7	-974.7	-281.7
Sydney Parramatta Ryde	-25.6	-19.2	-10.5	-115.7	94.1	-2.2	50.5	-187.2
Sydney South East	-13.6	-24.6	-12.0	-1917.7	108.3	-512.1	-1221.8	-278.0
NSW Central Coast	-10.1	-15.0	-8.1	-669.9	98.0	-142.7	-340.2	-111.8
NSW Central West	-15.4	-15.3	-7.6	-241.9	81.7	-39.0	-34.3	-61.9
NSW Coastal Hunter	-14.2	-13.6	-7.4	-329.4	95.6	-58.3	-82.5	-71.2
NSW Illawarra	-14.8	-17.6	-9.6	-671.3	88.8	-149.2	-338.3	-132.4
NSW Inland Hunter	-11.4	-13.0	-6.8	-313.8	79.4	-57.6	-93.9	-61.8
NSW Murray Far West	-16.6	-16.4	-7.5	-234.1	76.1	-37.2	-39.1	-66.9
NSW Murrumbidgee	-18.1	-18.1	-8.8	-304.1	77.0	-52.4	-96.7	-80.9
NSW North Coast	-10.5	-10.8	-6.7	-180.6	99.7	-19.6	26.9	-22.9
NSW Northern Inland	-20.4	-20.3	-9.6	-323.4	81.5	-56.8	-100.3	-75.4
NSW Northern Rivers	-12.7	-13.6	-7.4	-230.1	89.9	-33.9	-25.4	-44.1
NSW Orana	-18.6	-18.7	-8.8	-301.5	86.1	-53.6	-73.4	-73.9
NSW Southern Tablelands	-14.4	-17.1	-8.7	-332.1	95.5	-58.9	-80.9	-60.5
NSW South Coast	-14.8	-15.3	-8.6	-312.6	96.1	-50.9	-79.0	-55.9
Melbourne City	-105.0	-11.1	-7.2	3582.4	64.1	1218.0	2483.7	-276.8
Melbourne Eastern Inner	-17.0	-16.7	-9.0	-217.4	109.8	-36.6	-3.3	-88.1
Melbourne Eastern Outer	-12.9	-19.2	-9.3	-670.2	80.9	-144.0	-374.1	-178.9
Melbourne Northern Inner	-13.2	-16.4	-8.8	-309.7	78.4	-50.5	-108.0	-84.4
Melbourne Northern Outer	-15.7	-16.8	-9.4	-475.3	59.8	-97.3	-258.6	-137.2
Melbourne Southern Inner	-17.2	-16.9	-9.0	-158.1	107.9	-16.5	39.8	-62.7
Melbourne Southern Outer	-7.1	-14.7	-7.8	-742.0	69.3	-156.6	-442.6	-99.5
Melbourne Western	-12.3	-17.1	-9.6	-502.7	66.5	-99.5	-275.0	-135.0
VIC Geelong	-13.8	-15.2	-7.5	-740.2	77.2	-167.6	-420.3	-164.6
VIC Gippsland	-14.2	-14.6	-7.1	-252.5	82.1	-40.7	-54.2	-74.2
VIC Grampians	-12.7	-14.9	-7.2	-320.7	72.9	-57.9	-117.9	-92.5
VIC Hume	-14.2	-15.6	-8.2	-283.8	75.2	-47.1	-86.0	-74.0
VIC Loddon Mallee	-13.6	-15.4	-7.4	-383.8	78.2	-72.7	-155.4	-94.7
VIC South West	-17.2	-18.5	-8.7	-336.6	86.7	-57.3	-105.4	-92.1

Case three: Differential productivity change for a given industry across regions in accordance with the endowments of productivity growth drivers with capacity expansion (average annual impact) – continued

			Number per					
	Hours pe work	er capita of	capita of working age					
	populat	ion ('000)	population	\$ _{сvм}	per capita o	of working a	age populatio	n
	Industry	Resident						
	total	total		Resident			Household	Gross
SOR name	hours	hours	Resident	income from work	Capital	Tax paid	disposable	regional
SEO Brisbane City	_25.2	_17.7	-9.6	-59/1 3	127.8	-1/12 7	-238 5	-136.7
SEQ Brisbane City	-23.2	-17.7	-9.0	-5394.3	83.0	-142.7	-250.5	-130.7
SEQ West Moreton	-11.6	-15.9	-8.7	-283.0	70.1	-48 5	-113.0	-64.3
SEQ West Moreton	-73	-15.9	-7.7	-467.4	58.2	-92.9	-260.8	-105 3
SEQ Logar Rediand	-7.9	-16.5	-7.9	-645.0	66.2	-134.8	-379.3	-251.9
SEQ Sunshine Coast	-12.0	-13.7	-7.4	-499.3	90.3	-100.0	-214.1	-131.8
QLD Darling Downs South	12.0	1017			50.0	20010		101.0
West	-19.7	-19.3	-9.3	-253.5	67.6	-43.1	-72.1	-83.3
QLD Far North Torres	-16.6	-17.1	-7.6	-651.9	62.0	-132.5	-401.6	-189.6
QLD Fitzroy Central West	-21.3	-20.6	-10.5	-287.1	76.1	-56.7	-76.5	-80.9
QLD Mackay	-22.1	-20.2	-9.7	-287.4	73.8	-52.9	-78.7	-82.7
QLD Townsville North West	-19.6	-19.5	-8.6	-605.8	56.6	-130.8	-359.0	-210.0
QLD Wide Bay Burnett	-11.9	-12.7	-6.4	-196.1	73.7	-26.4	-37.7	-53.7
Adelaide South	-49.5	-30.9	-16.4	-179.8	91.3	77.7	-93.7	-292.0
Adelaide North	-11.3	-25.3	-14.0	-1116.9	68.3	-234.5	-756.2	-239.7
SA East	-22.0	-22.5	-10.7	-335.6	86.8	-50.1	-123.7	-109.3
SA Far North and West	-27.7	-23.7	-11.8	-418.0	76.6	-94.9	-166.9	-121.0
SA Fleurieu	-13.4	-26.2	-13.9	-915.9	92.0	-217.2	-521.5	-218.4
SA North	-13.5	-18.0	-9.1	-337.4	78.2	-56.8	-129.7	-81.5
Perth Central	-122.1	-62.3	-30.9	-89.0	110.9	120.7	-17.0	-1017.9
Perth Outer North	-20.1	-54.7	-24.8	-4590.3	77.2	-1242.2	-3196.3	-972.9
Perth Outer South	-14.4	-42.3	-20.0	-3147.1	82.7	-860.1	-2132.7	-485.6
WA Gascoyne Goldfields	-20.9	-18.3	-8.9	-295.6	81.3	-57.8	-82.6	-106.1
WA Peel South West	-15.4	-20.9	-10.3	-800.8	85.1	-203.5	-432.4	-207.9
WA Pilbara Kimberley	-41.7	-27.6	-13.7	515.1	82.2	184.3	502.5	-122.1
WA Wheatbelt Great Southern	-28.7	-30.9	-12.3	-535.9	88.2	-105.1	-259.2	-214.6
TAS Hobart South	-12.2	-12.3	-7.4	-137.4	85.9	-6.3	23.5	-35.1
TAS North	-12.0	-12.2	-6.5	-210.1	79.7	-30.9	-34.1	-51.6
TAS North West	-11.8	-11.7	-6.5	-99.1	81.2	-3.4	55.2	-48.1
NT Darwin	-21.7	-25.1	-12.0	-1210.5	123.0	-279.7	-718.0	-188.5
NT Lingiari	-21.1	-15.2	-7.3	48.9	65.9	19.9	157.5	-52.5
ACT	-13.2	-12.1	-7.4	-569.4	300.4	-53.7	-73.2	-22.5
Australia	-20.9	-20.9	-10.6	-631.7	91.5	-130.8	-334.0	-199.0

3. Industry structure and the regional economic base

Policies and investments to increase output per hour worked can be of very dubious overall benefit if they result in an unwanted decline in hours worked. Economic development is therefore not only about raising productivity; it is about generating jobs and hence about expanding the economic base of the region as well as making it more productive. Regional economic planners need to be aware of the economic base of their region. As we saw in Chapter 1, the colonial governments of nineteenth-century Australia were in no doubt that their economic base resided in their export industries. Later governments added import-competing industries. Together these can be referred to as the trade-exposed industries.

This identification of the economic base with the trade-exposed industries applies to regions as much as it does to national economies. Regional prosperity depends directly on exports to places outside the region, which may be overseas or other regions. At the regional level, however, importcompeting production is not usually as important at is at the national level. Businesses which are competing with imports at the national level are usually large enough to be exporters at the regional level – inter-regional rather than international exporters. Accordingly a region's economic base is its export industries. This economic base generates export income for the region, though exporting businesses may also have local sales. Local spending then generates further income through purchases from local suppliers, chiefly of services.

Individual incomes earned by activity in particular regions are commonly transferred to other regions by commuting, sometimes over quite long distances (fly-in fly-out). The extent to which commuting re-arranges income depends strongly on how regional boundaries are drawn: the smaller the region the more likely it is that income locally earned will differ from income locally received due to commuting. The *State of the Regions* systematically report both Place of Work incomes and Usual Resident incomes.

This simple structure is complicated by three pooling mechanisms.

- The corporate gross profit component of the value of production is pooled at corporate headquarters. Some of these gross profits finance investment within the business; some are paid out to shareholders wherever they may be (domestic or overseas) and many flow through further financial channels (such as superannuation funds) before they reach a household destination.
- Taxes are imposed on businesses and households, pooled (locally in the case of local government, nationally in the case of the Commonwealth) and returned to regions, partly as social security payments and partly as government services.
- Household savings sometimes remain within the region (as when a household contracts a local builder to renovate their home) but mostly find their way into financial assets, which again are pooled and on-lent, not necessarily within the same region. Households can also run down their savings and go into debt (dis-saving) which draws from the pool. These financial flows can also involve flows into the region, as when savings from outside the region are used to finance investments within it.

The State of the Regions reports follow this framework.

3.1 Exports as the primary measure of economic base

It would be preferable to measure the exports which define the economic base of each region in terms of value added; that is, export sales revenue less the value of inputs from other industries used in the production of the exports. However, these data are not readily available and the custom is to measure exports as the value of goods and services sold to buyers outside the region. Exports so measured may be divided into two groups, international exports and interregional exports. The two groups contribute equally, dollar for dollar, to regional income generation and prosperity, but international exports are a special class for three reasons.

- They form the national economic base.
- They are strongly affected by international circumstances and by the exchange rate (though, as we shall see later, import-competing industries also fall into this category).
- Until the advent of neo-liberal economics, and probably again in the not too distant future, export-promotion was a government preoccupation and policies were adopted to promote the prosperity of the export industries.

National concern for the prosperity of industries which export internationally is important for regional planners, in that it provides an argument for national support for these industries at the regional level.

This report analyses the contribution of each industry to the economic base and superstructure of each region industry by industry, followed by a discussion of the income-pooling mechanisms including commuting, property incomes, taxes and social security benefits. In describing the contribution of each industry to regional economies, it is helpful to employ a classification of types of region.

3.2 International exports

Australia is heavily dependent on mining as a source of export revenue. As at early 2017, mine products (including smelted metals) accounted for 58 per cent of Australia's export revenue (Table 3.1). As a result of the mining boom, this proportion had increased from 40 per cent during the 1980s. The main increase was in metal ores and metals (chiefly iron ore) which rose from 23 per cent of exports in 1984 to 33 per cent in 2017. Three other broad groups increased their proportion of exports, as follows:

- coal exports, from 11 per cent of the total to 17 per cent;
- exports of travel services (overseas visitors) from 6 per cent of the total to 12 per cent; and
- exports of other fuels (mainly gas) from 6 per cent to 8 per cent.

These increases were matched by three declines:

- rural exports declined from 29 per cent of the total to 12 per cent a very significant decline with strong regional implications;
- exports of transport services declined from 7 per cent of the total to 2 per cent, due to a
 decline in Australian-based shipping and (especially) air transport services; and
- exports of 'other goods' basically manufacturing declined from 14 to 11 per cent of the total, not perhaps as great a decline as might have been expected from publicity about the woes of manufacturing.

Table 3.1Composition of Australian exports, 1984 and 2017 (per cent)		
	1984	2017
Goods	82	81
Rural	29	12
Metal ores and metals	23	33
Coal	11	17
Other fuels	6	8
Other goods	14	11
Services	18	19
Travel	6	12
Transport	7	2
Other services	5	5

Source: ABS 5368.0 seasonally adjusted data, March quarter.

International exports are sourced from all over Australia, but there are pronounced regional patterns. These mean that changes in the composition of exports affect the regions differentially.

Gas

Unlike gas producers on the Asian mainland, Australia can only export its gas by sea, and then only as LNG (liquefied natural gas). This requires construction of expensive facilities and also consumes energy during the process of liquefaction. The cost of exported gas is accordingly significantly above the cost of gas sold on the domestic market.

Until recently the only LNG export facilities were in WA Pilbara Kimberley but recently facilities have been constructed at Gladstone, in Qld Fitzroy Central West, primarily to draw on gas from Queensland but connected by pipeline, and hence able to draw, from gas produced in SA, NSW or Victoria. These plants were committed during a period of high prices and general euphoria concerning both international demand for gas and its domestic supply. More sober judgements are now being made on both accounts and it remains to be seen whether LNG makes a lasting contribution to the economic base in Qld Fitzroy Central West and other connected supplying regions, notably Qld Darling Downs SW.

Coal

Australia is an established exporter of both metallurgical and steaming coal. Production for international export is confined to Queensland and NSW and involves six ports. The busiest coal export port is Newcastle NSW, which accounts for one-third of coal exports, drawn predominantly from Inland Hunter (responsible for 23 per cent of coal exports).

In Queensland, the port of Gladstone, which draws coal mainly from Fitzroy Central West, handles around 19 per cent of exports, while the two ports in Qld Mackay (Hay Point/Dalrymple Bay and Abbot Point) together handle that region's production, accounting for a further one-third of coal exports. The proposed Adani mine, though it would export through Abbot Point, is located in Qld Fitzroy Central West.

A further 8 per cent of exports, drawn mainly from NSW Illawarra, Sydney Outer South West and NSW Central West, are shipped from Port Kembla and a small remaining flow, drawn mainly from Qld Darling Downs SW, is exported through the port of Brisbane.

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The top three supplying regions (Qld Mackay, Qld Fitzroy Central West and NSW Inland Hunter) together account for 70 per cent of coal exports and the industry is accordingly highly concentrated geographically.

The outlook for coal exports, particularly exports of steaming coal, is clouded by climate change and demand is likely to diminish as importing nations strive to reduce greenhouse gas emissions. This threatens the national balance of payments and could undermine the prosperity of the three regions where international coal exports are prominent in the economic base. However, international coal exports from these regions are of recent provenance (the last three decades or so) and in the event that they collapse the three regions should be able to revive older elements in their economic base.

Metal ores and smelted metals

The production of metal ores and their primary processing is widespread across Australia. However, in 2017 no less than 78 per cent of total export revenue from of metals came from Western Australia, with 39 per cent from a single region, Pilbara Kimberley, a further 14 per cent from Gascoyne Goldfields and 10 per cent from Peel SW. The mining boom was indeed a rush to the West and did not much affect older-established metal mining regions such as Qld Townsville NW and NSW Central West. Indeed, due to mine exhaustion, a number of traditional mining regions, such as Tasmania NW and NSW Murray Far West (which includes Broken Hill) are no longer numbered among the significant international exporters of metals. By its nature, mining depletes resources and cannot be relied on as a permanent element in a region's resource base. This said, mine exhaustion does not appear to be an immediate prospect in Pilbara Kimberley.

Metals prices are determined on world markets and tend to settle close to the cost of production in fairly high-grade mines, but can spike upwards if there is an unexpected increase in demand (as happened when China's demand for iron ore triggered the mining boom). The industry is capitalintensive and when additional capacity is being built generates considerable employment in construction; this was the essence of the mining boom, which has now entered the phase of increased production at falling prices.

Rural products, food processing and beverages

Nearly all non-metropolitan regions generate international exports from agriculture, fishing and forestry and the related manufacturing of foods and drinks. In addition, most metropolitan regions generate exports of processed foods and beverages. The decline in the significance of rural-based exports is accordingly of very widespread concern, and a great many regions await a revival of national interest in underpinning the prosperity of the rural export industries.

Manufacturing

Manufacturing other than food, beverages and primary mineral processing continues to yield significant international export revenue. Though export production is widespread, it is particularly concentrated in the middle to outer suburbs of the metropolitan areas such as Sydney Mid West (which accounts for 9 per cent of this class of exports) and Melbourne Inner South (which is responsible for 8 per cent). The claim of these regions on national economic strategy is based not only on their export contribution; they also generate jobs in parts of metropolitan areas which are otherwise job-deficient, and can add value to the export ideas generated in the knowledge-economy of the inner metropolitan areas.

Travel

Australia's exports of air travel services are concentrated at its major airports, in particular Sydney (Sydney Eastern Shores) with smaller contributions from Melbourne, Brisbane and Perth. Tourism exports of accommodation and related services concentrate in the metropolitan centres (particularly Sydney), Qld Gold Coast, Qld Far North Torres and NSW Southern Tablelands.

Information, finance, professional services and education

In the *State of the Regions* reports NIEIR has emphasised the increasing importance of the knowledge economy. This has now reached the point where international exports of knowledge-intensive services are roughly as significant as exports of manufactured goods (excluding food, beverages and primary metals processing). These exports include, inter alia, IT, media, finance, professional services and tertiary education. The major regional sources for these exports are the central regions of the five metropolitan cities – one-third of the national total comes from Sydney Metropolitan Core alone – and most of the rest are generated in the inner to middle suburbs of Sydney and Melbourne.

Other international exports

We are left with a collection of minor industries which contribute to the export effort, often by providing services to more readily-identifiable export industries. These include transport, warehousing and real estate services. As might be expected, these exports are sourced from all regions, with an emphasis on the metropolitan centres and middle suburbs.

International exports as a whole

Putting these together, all regions contribute to international exports, but the exports from some of them are considerably greater than others. In summary:

- 18 per cent of international exports originate from the core metropolitan areas (6 per cent from Perth Central alone, thanks to its importance in services to mining);
- 26 per cent originate from other parts of the metropolitan areas. There are 21 of these so the average contribution per region is a little under 1 per cent of total exports;
- 39 per cent are generated in the major mining regions (17 per cent in WA Pilbara Kimberley alone); and
- 17 per cent come from the remaining non-metropolitan regions. There are 29 of these regions, so the average contribution is 0.6 per cent of exports, much less than in the days of rural prosperity.

When the national government again turns its mind to the importance of increasing export earnings to reduce the current account deficit (the balance of payments deficit, which is different from the budget deficit which the media are constantly fretting about) regional planners will be called on to cooperate with the national effort, and accordingly need to know their international export industries and have strategies developed for the future prosperity of these industries.

3.3 International and interregional exports

NIEIR estimates that international exports comprise a high proportion of total exports in miningbased regions. The proportion is highest (63 per cent) in NSW Inland Hunter, where the coal industry has a long history but has recently expanded into parts of the region which were wholly agricultural up to a few decades ago. The proportion is also high in WA Peel SW (61 per cent) and in the adjacent Perth Outer South, where international exports of smelter products (especially alumina) outweigh the traditional agricultural and tourism exports of the region. Perhaps surprisingly, the proportion of international exports is a little lower (48 per cent) in the current premier mining region, WA Pilbara Kimberley, due to interregional exports of gas by pipeline to other WA regions. Other mining regions where international exports are a little less than half total exports include Qld Fitzroy Central West and WA Gascoyne Goldfields.

Among agriculture-based regions, the highest ratio of international to total exports is reported by WA Wheatbelt Great Southern, at around 50 per cent. In other agricultural regions the ratio tends to lie in the 20-30 per cent range, while in lifestyle regions it clusters around 20 per cent. In these regions interregional exports of domestic tourism generally outweigh the international exports.

The lowest ratios of international to total exports, around 10 per cent, are reported by the metropolitan core regions and one independent city, the ACT. Though, as noted above, these regions are responsible for significant exports of services, their service exports are heavily weighted towards interregional sales. Commuter suburbs report higher proportions of international exports, reaching as high as 25 per cent in manufacturing-oriented regions.

However, as already noted, international exports are but part of the typical regional economic base. The other part comprises interregional exports.

3.4 Industry contributions to regional exports

The importance of the major industry groups in the economic base of each region can be gauged by the industry contributions to total exports (international plus interregional).

Mining and smelting

As indicated when discussing international exports, mining and smelting are overwhelmingly important in the exports several regions. The two regions most dependent on mining exports are:

- WA Pilbara Kimberly, 97 per cent of regional exports; and
- WA Gascoyne Goldfields, 90 per cent.

After a gap, three more follow:

- Qld Mackay (79 per cent);
- SA Far North and West (78 per cent); and
- NSW Inland Hunter (77 per cent).

In six further regions mining and smelting accounts for more than half of regional exports (WA Peel SW, NT Lingiari, Qld Townsville NW, Qld Fitzroy Central West, NSW Central West and NSW Illawarra).

There is little that regional economic development authorities can do to attract, retain or for that matter repel mining. The usual strategy is to attempt to gain as much benefit for the region as possible, including employment and the construction of infrastructure which is useful post-mining. The question of environmental rectification also looms large.

A small portion of the mining industry, which is important in the immediate hinterland of major cities, is the quarrying of construction materials. Here local environmental regulation and transport investments can significantly affect location.

Rural production, food processing and beverages

Farms and pastoral properties produce outputs for sale on both world and domestic markets, which means that they produce both for international export and for interregional export. The value of production is frequently enhanced by local processing, as in the wine, sugar and dairy industries. Rural production defined to include food processing and beverages provides a little more than half of total exports in three regions (Vic SW, SA East and Vic Loddon Mallee) and not far short of half in six more (Vic Hume, SA North, WA Wheatbelt Great Southern, Vic Grampians and SA Fleurieu and Qld Darling Downs SW). We have identified 15 regions are agriculture-based, but agriculture also makes a significant contribution to exports in a number of mining-based, lifestyle and commuter-suburb regions.

It may come as a surprise that, even in the most farm-dominated regions, rural production and flowon manufacturing generates little more than half of total exports. What other exports are there? Some basically agricultural regions host mines which diversify their export profile even though they may affect no more than a small corner of the region. All agriculture-based regions have at least a little tourist traffic. Other basically rural regions have diversified with education exports (e.g. NSW Northern Inland) and one, Vic Loddon Mallee, exports financial services. All rural regions export transport services, whether as components of the local rural supply chain or supporting tourism or other transport flows which cross the region.

From a local economic development point of view, rural and food production has completely different characteristics from mining. With good farming practices production can be sustained indefinitely, hence the investment time horizon is potentially long and regional infrastructure investments are likely to pay off indefinitely. There is also a much closer connection to consumer markets – minerals go through elaborate manufacturing processes before final sale to consumers, whereas many agricultural products are consumed direct from the farm. Though middlemen and manufacturers are prominent in many rural supply chains, there are generally opportunities for product development and marketing strategies at the regional level, including regional branding.

Despite these opportunities, rural production has been in the doldrums over the past thirty years, as exemplified by its declining salience in total Australian exports. Various reasons have been given for the decline, including:

- lack of buoyancy in international markets, the joint result of lack of purchasing power in lowincome countries and restrictions on access to high-income markets. The high-income market for basic (as distinct from specialty) agricultural products is also limited by the fact that there is only so much that people can eat without becoming obese or diabetic;
- several agricultural industries have been subjected to overseas competition as a quid pro quo for access to overseas markets. The net effect does not seem to have been very positive – if the increased market access really were worthwhile, international rural exports should have increased;
- the high exchange rate experienced during the mining boom also reduced profitability and in turn brought low investment; and

 environmental limitations have capped production. Droughts, floods and cyclones have long affected production, and it may be that climate change is altering the crops which can successfully be harvested in some regions.

The Australian government has been constantly, though not very effectively, active in trying to prise open access to protected high-income markets. It has been less active in pressing for income increases in low-income markets and provided no recompense for the high exchange rate, and could have done more for the development of speciality and niche-market agricultural products and processed foods. When the federal and state governments again turn their attention to the export industries there will be opportunities for regional planners to seek investment and participation in regional developmental programs.

Manufacturing other than food, beverages and primary metals

For over a century Australian manufacturing was considered primarily as a tariff-protected importcompeting industry and it still labours under the sarcasm of the past generation of advocates of free trade, with their talk of uncompetitive rust belts. However, as noted above, here and there Australian manufacturing generates international exports and its recent export performance has generally been better than the rural sector. Not surprisingly, when interregional exports are added in, manufacturing forms an important part of the economic base of a number of Australian regions. As a component of the economic base, manufacturing is most important in one independent city (Vic Geelong, where it accounts for half of total exports) and otherwise in an array of middle to outer commuter suburbs, where it accounts for 20-30 per cent of exports (as high as 36 per cent in SEQ Moreton Bay).

Among the independent cities, one tends to think of Newcastle (NSW Coastal Hunter) and Wollongong (NSW Illawarra) as manufacturing centres but Wollongong in particular appears to have failed to diversify out of primary metal smelting. On the other hand, a number of regions which are primarily agriculture-based host diversified manufacturing industries as significant elements in their economic base. These regions include SA North, SA East, Tasmania North and Tasmania NW.

The Commonwealth government introduced a number of industry development programs for manufacturing during the early 1990s, but allowed them to peter out during the urban land boom of 2001-08 and subsequent mining boom. It is very likely that such programs will be reinvented when the government again turns its attention to export promotion. Regional planners should be on the lookout to take advantage of such reintroduction.

Manufacturing is a skilled and risky business. It is no accident that it thrives in outer suburban locations, which can draw on metropolitan skills at relatively affordable land and transport costs.

Tourism

The international trade accounts show a rising level of 'travel' exports, and there is no doubt that there is also substantial interregional trade due to travel and tourism. These exports are supplied by a wide variety of industries, frequently as minor additions to local demand. The *State of the Regions* report for 2016-17 includes estimates of tourism exports and imports by region for 2000 and 2015 (Tables 6.3 and 6.4). In 2015 inner Sydney (the metropolitan core including the airport) captured 21 per cent of Australia's tourist trade (international plus interregional) with inner Melbourne and its airport following at 11 per cent, inner Perth at 8 per cent and Adelaide South at a little under 4 per cent. A proportion of this would reflect business travellers, though if business travel is highly important one would expect the ACT to attract a larger share than its meagre 0.5 per cent of the total market.

International tourists do not seem to get far from the major international airports and in 2015 between 45 and 50 per cent of tourist earnings in Sydney, Melbourne and Brisbane came from international tourists, followed by around 38 per cent in Perth and 30 per cent in Adelaide.

Outside the five metropolitan areas SEQ Gold Coast had the largest exports followed by Qld Far North Torres. Though these regions had international air services, the international share in their tourism exports was lower than in the capital cities. Elsewhere the international share went very low – right down to 2 per cent in NSW South Coast.

Though the lion's share of the tourism trade is captured by the metropolitan centres, in these regions tourism is but one of many export industries. Judging by exports of accommodation and food services in relation to total exports, tourism comprises a significant proportion (around one fifth) of the economic base in SEQ Sunshine Coast and SEQ Gold Coast, followed by NSW South Coast (with its heavy reliance on domestic tourism), NSW Northern Rivers and Qld Far North Torres (the proportion would be much higher for Cairns and its immediate hinterland – the region also exports minerals from places where tourists rarely go).

Regional economic planners are often greatly exercised to attract tourists and the effort can be worthwhile, particularly if well-targeted. Even if the effort is not particularly successful, the kinds of regional facilities and promotions which are targeted at tourists are often appreciated by local residents, including prospective local residents.

Public utilities

By their nature, Australia's electricity and water supply industries cannot export internationally. Much of their activity is to meet local demand by maintaining and operating local networks. However, they can and do export inter-regionally. The most prominent region in this regard is Vic Gippsland, where public utility (electricity and gas) exports account for 19 per cent of total exports.

A switch from coal-based to renewable electricity is already under way and is likely to accelerate as old thermal power stations reach the end of their economic lives, the cost of renewable generation falls and means of dealing with the intermittency of wind and solar generation are developed. It is arguable that this switch will reduce interregional exports as regions increase their reliance on locally-generated solar power; however it is equally arguable that complex patterns of interregional trade will develop as regions match generation with demand. Regional planners will need to keep abreast of the changing technology of energy supply and of efficient energy use.

Wholesale trade

For the most part wholesale trade services are produced locally for local use and therefore do not form part of the economic base. However wholesale trade services, along with transport services, are exported internationally as part of the value of goods exported, and there is also interregional trade, largely between the middle suburbs of the major metropolitan cities (especially Sydney and to a lesser extent Melbourne) and the rest of the country. The contribution of wholesale trade to total exports is highest in the commuter suburbs of Sydney (28 per cent in Northern Shores) and Melbourne (22 per cent in Outer East).

Much has been written about the digital disruption of retailing and of the threat that this represents to employment in that industry. Though some of the resulting gain will go overseas (there is an incentive to order items direct to avoid GST) the main gains will be to the warehouse and delivery service operators, operating from commuter suburb locations.

Retail trade and other services to households requiring personal interaction

Like wholesale trade, retail services are mostly produced locally for local consumption. However, there is an element of export trade, a little of it international (sales to overseas tourists) and most of it interregional (sales to domestic tourists, sales to people who live in one area and shop in another). Retail trade looms particularly large as a proportion of total exports in commuter suburbs with major shopping centres and relatively weak general export industries, the prime examples being Melbourne Inner South, Sydney South East and Sydney Northern Shores. In regions like SEQ Sunshine Coast tourism exports are complemented by exports of retail services. By contrast, retail exports are swamped by other exports in the core metropolitan areas and are weak in most outer suburban commuter suburbs, independent cities, agriculture-based regions and benefit-based lifestyle regions.

Transport

Many transport services are produced locally for local consumption or as local business inputs; however a few regions specialise in transport. Transport services, both international and interregional, are most significant in the two regions with major airports, Sydney Eastern Shores and Melbourne Outer North, where they comprise more than half of total exports. However, all regions export transport services, whether air, road, rail or shipping. The typical contribution of transport to total exports is small in the metropolitan core regions, around 3 per cent in the mining-based regions and 5 per cent in the agriculture-based regions. In the independent cities, lifestyle regions and commuter suburbs it depends on the location of particular facilities, such as the port and airport of Darwin and similar facilities in Qld Torres Far North. Melbourne West and Sydney Outer West are both centres for logistics, hence their exports of road transport and warehousing services.

Telecommunications, media and information

Interregional exports of telecommunications, media and information services originate mainly in the core metropolitan regions – they are knowledge-economy services par excellence. In these regions they can form up to 20 per cent of the economic base. There is some overflow into inner commuter suburban regions and also to the ACT and to Tasmania South. Exports from non-metropolitan regions are negligible.

Finance

Exports of financial services comprise around 30 per cent of total exports from Sydney Metropolitan Core and the City of Melbourne. There is some overflow into the inner commuter suburbs of Sydney and to Adelaide South, Perth Central and SEQ Brisbane City, but very little to non-metropolitan regions – the only two with any financial services exports to speak of are Tasmania North and Vic Loddon Mallee.

Real estate and construction

By definition, construction activity takes place on the soil of a region and is therefore not exported. However, related financial services – real estate services – are exported. They form significant parts of the economic base in regions with inflowing property investment, reaching around 30 per cent of the total exports in SEQ Gold Coast and Sunshine Coast and 9 per cent in NSW South Coast. The level of activity is also high in the metropolitan core regions, but here it forms a smaller part of total

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exports due to the presence of other export industries, particularly finance. Otherwise, apart from overflow from the core metropolitan regions into the inner suburbs, export activity is generally negligible.

Professional services

Many professional services are produced for local consumption or as local inputs to other industries, but such services are significant exports from the metropolitan core regions, where they comprise around 12 per cent of total exports, with overflow into the inner suburban commuter regions. There are negligible exports from mining-based and agriculture-based regions and exports are also low from the independent cities (except the ACT) and lifestyle regions, which have yet to use their lifestyle advantages as drawcards for professional service providers.

Administrative services

Administrative services are various kinds of outsourced office activities including IT support. They are nearly all produced locally for the support of local business, though there is some interchange within metropolitan areas.

Public administration and defence

Much public administration, including all local government administration and much state and federal administration, is produced locally to meet local needs. However, state government administration concentrates in the core metropolitan regions and Commonwealth administration in Canberra and defence facilities are concentrated in particular regions. In so far as these regions of concentrated public service employment provide services for the country as a whole, it makes sense to speak of them as exporting public administration and defence services; however, estimates of exports of public administration services are necessarily approximate. This is because, with the exception of local government, public money is administered centrally in the state capitals and Canberra and there is no official division between spending to meet local needs and spending for interregional benefit.

Subject to these caveats, NIEIR estimates that public administration accounts for 73 per cent of exports from the ACT while among the metropolitan core regions it generates between 12 per cent of exports (SEQ Brisbane) and 5 per cent (Perth Central and Sydney Metropolitan Core) – and in the Tasmanian capital too; 12 per cent in Tasmania South. Defence installations are important generators of export income in selected regions, such as Qld Townsville NW, NT Darwin, SEQ West Moreton and Adelaide North. Elsewhere the regional significance of a defence installation depends on the strength of other export industries. Where these industries are weak, as in NSW South Coast, public administration can provide 18 per cent of total exports; where they are strong, as in Qld Townsville NW, the relative significance of public administration exports is less but still significant at around 6 per cent.

Education

As with most other services, education is generally produced locally for local students. However, secondary students are mobile enough to cross regional boundaries and tertiary students move between regions and countries. In absolute amounts the largest exports of education come from the metropolitan core regions, however, the largest contributions to the regional economic base are

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from regions where the other export industries are subdued, including one commuter suburb (Melbourne Inner East), two independent cities (Vic Geelong and NSW Illawarra), one agriculturebased region (NSW Northern Inland), and several lifestyle regions (NSW Northern Rivers and Tasmania South).

Health services

Health services are mostly produced locally for local clients but large hospitals generally serve an interregional clientele. Interregional exports by hospitals and other medical facilities located in core metropolitan regions are considerable, but the regions where they are constitute a significant proportion of total exports are generally commuter suburbs (e.g. Sydney SE, Melbourne Inner North) or independent cities (e.g. Tasmania South, NSW Coastal Hunter).

Recreation services

Recreation services, including gambling, are mostly produced for local consumption but in a few regions add to tourism exports. They comprise 10 per cent of exports from SEQ Gold Coast, 7 per cent from NT Darwin and Melbourne Outer South and 6 per cent from NSW Southern Tablelands (which include ski resorts).

3.5 From exports to regional incomes

Regional exports generate regional incomes (on a place of work basis) via their contribution to regional gross value added. Adding export revenues (both international and interregional) to local sales revenues gives total sales, from which imports (both international and interregional) are subtracted to give gross regional value added. Offsetting export revenues and payments for imports gives the regional balance of trade – the net extent to which a region is financed by transfers in the form of commuter transfers, property income, taxes, benefits and capital account items, broadly lending and borrowing. (In the structure adopted here, tax-financed government services are treated as exports, but as remarked above the estimation of exports and imports of government services is hazardous.)

As noted above, for the past three decades governments have left the balance of payments to the market, and so tolerated an increase in international indebtedness which renders Australia vulnerable to economic crises, whether generated domestically or imported from overseas. The balance of trade is the major component of the balance of payments.

Regional balances of international trade

The national balance of trade is calculated by offsetting revenue from exports of goods and services against spending on imports of goods and services. In 2015-16 Australia's payments for imports exceeded export revenues to generate a balance of trade deficit of \$36bn. In 2016-17 it is likely that a balance of trade surplus will be recorded.

Similar calculations can be performed when export revenues and import expenditures are allocated to regions, though the estimates should be treated with caution in that the algorithms used to allocate exports and imports to regions give approximate rather than definite answers. In 2015-16, against the background of a national trade deficit, only eight of the 67 regions recorded surplus balances of international trade. These comprised six of the eight mining-based regions, one of the 15

agriculture-based regions and one core metropolitan region. Reflecting the mining boom, five of the eight surplus regions were located in WA. All other regions recorded deficits on the balance of international trade. These deficits were relatively small (up to 6 per cent of gross value added) in the remaining mining-based regions and (up to 12 per cent of value added) in the remaining core metropolitan regions. In the remaining agriculture-based regions the deficits ranged up to 25 per cent of value added. In the independent cities the deficits ranged between 7 and 27 per cent of value added; in the commuter suburbs between 5 and 33 per cent of value added and in the lifestyle regions between 10 and 30 per cent.

These estimates once again emphasise that Australia's heavy reliance on mining exports, the result of the mining boom, has concentrated the generation of net exports in a few regions. The agriculturebased regions, which for much of Australia's history have been the mainstay of the national economy, have lost this position – the sheep's back is no longer strong enough for Australia to ride on. The core metropolitan areas have developed significant exports, but not enough to cover the cost of their own imports, let alone those of whole metropolitan areas and their attendant lifestyle regions.

Balances of interregional trade

In similar fashion, estimated interregional exports can be offset against estimated regional imports to provide regional balances of trade. Since these are at the end of a trail of calculations, with much opportunity for misestimation, they should be treated with caution; however it is possible to comment on broad patterns. Across the whole country, by definition, interregional imports counterbalance interregional exports, and one would therefore expect a rough balance between the number of net exporting and the number of net importing regions. However, this is not achieved: it is estimated that 14 of the 67 regions are net interregional exporters, the rest being net interregional importers.

By region types:

- four of the nine mining-based regions are net interregional exporters, mostly involving gas for domestic market use or mineral ores for processing elsewhere in Australia. The others have low interregional exports and run deficits on interregional trade, some of them quite substantial;
- all of the core metropolitan regions are net interregional exporters. The importance of financial services has been emphasised above;
- only one of the independent cities is a net interregional exporter, though this estimate depends on the way government services are treated;
- only three of the 20 commuter suburbs have sufficient overflow of knowledge-economy activities from the metropolitan core regions to be net interregional exporters, and some of them are running significant deficits;
- none of the lifestyle regions are net interregional exporters; and
- none of the agriculture-based regions are net interregional exporters and some of them are running significant deficits.

This pattern of interregional trade, by which the core metropolitan regions provide services for all the rest, is long-established, founded as it is on the longstanding knowledge-economy advantages of the metropolitan centres.
Regional balances of trade

Adding international and interregional trade, we conclude as follows.

- In 2016, only 13 of the 67 regions generated surpluses on their balances of trade.
- 6 of the 9 mining-based regions generated surpluses. The largest surplus in relation to gross regional value added was in the iron-ore/gas region of WA Pilbara Kimberley followed by WA Gascoyne Goldfields. WA Peel SW and NT Lingiari turned in significant deficits.
- All six metropolitan core regions generated surpluses, those for Sydney and Melbourne being substantial.
- Only one commuter region reported a surplus (Sydney Eastern Shores); the rest recorded deficits which were substantial in some of the outer suburban regions.
- All the independent cities were in deficit.
- All of the lifestyle regions generated deficits, generally higher in the benefit-dependent regions than in those with export income from hospitality or agriculture.
- All of the agriculture-dependent regions generated deficits, reflecting the depressed state of agriculture as an international export industry.

By itself a negative balance of trade depresses income, but its effect on regional disposable incomes depends on the various transfer mechanisms which, inter alia, transfer income from regions with trade surpluses to regions with trade deficits, thus generating regional gross value added.

As shown in Table 1.2 above, across all industries and all Australia regional incomes comprise around two-thirds of gross value added.

To put the relationship between exports and regional incomes differently, exports generate local incomes in three ways.

- By direct wage, salary and mixed income payments to local employees and business proprietors. These are less than the value of the exports due to the cost of imported inputs and also due to subtraction of the share of corporate gross profits in value added. There are considerable differences between export industries in the proportion of export revenue paid out as regional incomes.
- By the 'type 1' multiplier effect of business purchases of inputs from local suppliers, again counting only the income generated by these purchases. Once again there are differences between industries in local input sourcing (which are documented in the regional input-output tables incorporated into NIEIR's economic models).
- By the further, 'type 2' multiplier effect as local income recipients buy goods and services locally, again counting only the income generated by these purchases. These multiplier effects differ from 'type 1'effects in that they do not vary by the export industry which generated the local income, but rather vary by the characteristics of the households receiving the income.

These calculations give regional income generated directly from the economic base. However, actual regional incomes diverge from this level due to interregional income transfers, in turn due to three mechanisms:

- commuter transfers of income from their place of work to their place of residence;
- the pooling and distribution of property income; and
- the tax-transfer system.



Regions where consumer incomes are supported by these transfers will experience enhanced production in the consumer-serving industries (effectively increasing the type 2 multiplier effects of exports). There will be corresponding dampening of the multiplier effect in regions where incomes are reduced by transfers.

Across Australia and across all industries regional income generated by exports after the deduction of inputs sourced from other regions is approximately 75 per cent of the total of international and interregional export sales. There are, however, pronounced regional differences in this ratio.

- In the core metropolitan regions it mostly lies between 50 and 70 per cent, but rises to 100-per cent in SEQ Brisbane City.
- In commuter suburbs the range is wider, from 60 to 360 per cent, but mostly around 120 per cent.
- In lifestyle regions the ratio runs from 70-80 per cent in Vic Gippsland and Tasmania to 220 per cent in Qld Sunshine Coast but is typically around 120 per cent.
- In the independent cities the ratio ranges upwards from 100 per cent (NSW Coastal Hunter) to 310 per cent (NSW Central Coast).
- In the agriculture-based regions the ratio ranges from 50 per cent (WA Wheatbelt Great Southern) to 120 per cent (Vic Loddon Mallee), but is generally below 100 per cent.
- Finally, in the mining-based regions the ratio ranges from 10 per cent (WA Pilbara Kimberley) to 50 per cent (NSW Inland Hunter, WA Peel SW and NT Lingiari).

These variations reflect industry mix. Regions with low ratios tend to specialise in industries like mining with low local income generation ratios and regions with high ratios tend to benefit from income transfers including commuting.

3.6 Industry contributions to regional income

Theoretically it would be possible to split regional incomes into two components: that generated by the economic (export) base and its multipliers and a positive or negative component generated by income transfers and their multipliers; however the split is not directly observable. It is, however, practicable to use ABS and taxation data to estimate the income generated by each industry in each region. These estimates are derived from multiple sources and involve an array of assumptions, and are not therefore accurate to the nearest cent; however they provide insights into the role of the various industries in regional economies.

Data on income earned can also be matched against data from on hours worked to obtain estimates of income generated per hour. The data on hours worked come from the ABS Labour Force surveys and are not precisely matched to the National Accounts data on income generated; hence further need for caution in interpretation. In particular, the regional data has been adjusted to state-level control totals provided by the ABS. This adjustment affects all regions in the state, lifting some states and depressing others, and means that within-state patterns are more meaningful than comparisons between regions which are separated by state borders.

Growth in income generated per hour worked is a fundamental indicator of prosperity, since it permits increases in incomes, provided employment is maintained. Table 3.2 provides estimates of industry performance Australia-wide over the past 24 years, while Table 3.3 provides estimates of employment generated, measured in hours (measured in jobs the growth rate has been higher due to the increase in part-time work). It is noticeable that growth in both income generated per hour worked and in hours worked was more rapid during the land boom of the early 21st Century than they were during the succeeding mining boom. These data provide background for a discussion of regional patterns.

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Table 3.2Average income generated per hour worked and rates of growth of income per hour worked, by industry, Australia, 1992 to 2016									
Industry	\$ 1992-2016	% p.a. 1992-08	% p.a. 2000-16	% p.a. 1992-16					
Agriculture and food processing	31	31 1.8		2 1.5					
Coal mining and petroleum extraction	67	1.3	0.2	2 0.7					
Metal ore mining and smelting	43	0.8	2.6	5 1.7					
Mining support (exploration)	63	-1.5	1.4	4 -0.1					
Other manufacturing	34	2.6	1.1	1.1 1.8					
Electricity, gas, water supply and sewerage	52	0.2	-1.6	-0.7					
Waste management, cleaning, repairs	30	0.8	0.0	0.4					
Construction	40	1.1	2.3	1.7					
Wholesale trade	47	4.5	0.7	2.5					
Retail trade, food services, entertainment	25	1.7	1.9	1.8					
Accommodation	20	-0.5	-0.2	-0.3					
Transport	33	33 2.4		2.4					
Telecommunications	29	7.1	6.8	6.9					
Media, information and administrative services	69	2.0	1.3	1.7					
Finance and insurance	57	4.6	2.7	7 3.7					
Real estate and rental services	39	4.9	2.4	3.6					
Professional, scientific services	44	3.5	1.3	2.4					
Public administration, justice and defence	52	52 1.2		0.8					
Education	40	2.2	2.4	2.3					
Medical services including hospitals	33	2.4	3.7	3.1					
Residential care and welfare services	47	2.8	0.8	1.8					
Gambling	30	9.4	0.8	5.1					
TOTAL	39	2.5	1.9	2.2					

Note: Income for each year deflated by the Chain Value Method. Rates of growth are for the spans 1992-2000 to 2001-2008, 2001-2008 to 2009-16, and 1992-2000 to 2009-16. Industry definitions are not the same as in Table 1.2 and consist of groups of 2-digit industries.

Source: ABS National Accounts and Labour Force survey.

Table 3.3Hours worked and rates of gro	Hours worked and rates of growth of hours worked, by industry, Australia, 1992 to 2016									
Industry	% hours 1992-2016	% p.a. 1992-08	% p.a. 2000-16	% p.a. 1992-2016						
Agriculture and food processing	6.5	6.5 1.3		-0.6						
Coal mining and petroleum extraction	0.6	4.7	8.2	6.4						
Metal ore mining and smelting	1.5	6.4	1.9	4.1						
Mining support (exploration)	0.4	2.4	6.2	4.3						
Other manufacturing	8.2	1.8	-3.5	5 -0.9						
Electricity, gas, water supply and sewerage	0.9	1.8	3.3	2.5						
Waste management, cleaning, repairs	3.4	6.1	0.0	3.0						
Construction	8.3	5.7	2.3	4.0						
Wholesale trade	6.3	0.9	-1.4	-0.2						
Retail trade, food services, entertainment	17.7	3.1	-0.5	1.3						
Accommodation	1.3	5.7	-1.7	1.9						
Transport	4.3	4.1	1.3	2.7						
Telecommunications	0.9	-1.0	-1.4	-1.2						
Media, information and administrative services	4.3	6.6	1.0	3.8						
Finance and insurance	4.1	2.9	0.7	1.8						
Real estate and rental services	1.3	4.8	0.4	2.6						
Professional, scientific services	6.2	4.2	1.4	2.8						
Public administration, justice and defence	6.5	3.9	2.2	3.0						
Education	7.5	4.2	0.8	2.5						
Medical services including hospitals	6.0	4.0	1.0	2.4						
Residential care and welfare services	3.4	5.0	2.5	3.8						
Gambling	0.3	2.1	-0.6	0.7						
TOTAL	100.0	3.5	0.3	1.9						

Rates of growth are for the spans 1992-2000 to 2001-2008, 2001-2008 to 2009-16, and 1992-2000 to 2009-16. Industry Note: definitions are not the same as in Table 1.2 and consist of groups of 2-digit industries. Source:

ABS Labour Force survey.

Agriculture and food processing

As noted in Table 3.2 above, average incomes generated per hour worked in agriculture and food processing have been around 80 per cent of national average, and have been growing at less than the national average rate. Income generation per hour tends to be higher in the urban food processing industry than it is in the rural agricultural and forestry industry, though it is likely that these estimates reflect the continuing presence in the industry of semi-retired and semi-commercial farmers. Were these farmers removed from the lists, income generated per hour would go up but hours worked would go down.

Hours worked in the industry grew during the land boom but have since declined quite rapidly, so the contribution of the industry to regional economies has been declining due to both declining hours and declining income generated per hour.

By definition, agriculture and food processing are important sources of income in agriculture-based regions. The range is from 11 to 30 per cent – the most heavily agricultural regions are SA East and WA Wheatbelt Great Southern. Agriculture also makes a significant contribution to income in some of the lifestyle regions, and a less significant contribution in some of the mining-based regions. Food processing occurs not only in agricultural regions but in parts of the metropolitan areas. SEQ West

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Moreton is unusual in that, though it is dominated by commuter suburbs, its boundary includes an important area of intensive agriculture.

Mining and smelting

Despite its importance in overseas trade, the mining industry is a small employer. Even when the primary processing of metallic ores is counted as part of the industry, it accounts for but 2.5 per cent of hours worked over the past quarter century.

In Tables 3.2 and 3.3 the industry is divided into three components.

- Energy mineral production (coal, oil and natural gas) recorded the most rapid rate of growth of hours worked, especially during the mining boom. Even excluding corporate profits, it generated local incomes per hour worked 70 per cent over the national average, though the rate of growth of these incomes was less than national average. High incomes are to be expected in an industry with a high proportion of professional personnel and of personnel working in remote areas. Income generated per hour worked in oil production is higher than coal (which requires more equipment operators), hence higher average earnings in the production of fuels in WA and Vic Gippsland than in Qld or NSW.
- Hours worked in metal ore production and primary processing increased at above the national average rate and also generated income per hour worked above the national average rate but not as far above as in the other components of the industry, and not growing as quickly either, though the rate of growth of income generated increased during the mining boom. Given the publicity given to high incomes earned in remote areas, it is interesting to find that average hourly income generation in metal ore mining and smelting is not much above national average. It should be remembered that many of the hours worked, in primary processing in particular, are not in remote areas, and also that many of the jobs require plant-operation rather than professional skills. Income generated per hour worked has been noticeably higher in the remote mining-based regions than in regions which specialise in the primary processing of mineral ores.
- The final component of the industry is 'services to mining', which is dominated by mineral exploration. Thanks to the employment of professional personnel in remote areas, mineral exploration generates high incomes per hour worked, though these incomes have been stable in real terms over the past quarter century.

By definition, mining is an important source of income in mining-based regions. The range is from 11 to 46 per cent – the most completely mining-based region is WA Pilbara Kimberley. Smaller mines and smelters are scattered through the agriculture-based and some lifestyle regions. Mining contributes 8 per cent of income in Perth Central and also contributes in the Perth commuter suburbs.

Manufacturing other than food processing and minerals smelting

Of all industries, manufacturing has suffered most during the mining boom – hours worked have fallen even more rapidly than in agriculture. Despite this, the industry remains the most substantial of the trade-exposed industries, generating more hours of work than either agriculture or mining. As in agriculture, income generated per hour worked is below national average. Though in the early 21st Century it was growing at the national average rate but during the mining boom it fell behind.

Income generated per hour worked tends to fairly similar across the regions of each state, though there appear to be inter-state differences due to the aftermath of the mining boom, with relatively low income generation per hour worked in Victoria and relatively high in NSW and WA.

In the commuter suburbs, manufacturing contributes between 4 and 13 per cent of income – less in inner and high-status suburbs, more in middle and outer suburbs. The highest regional contribution is 13 per cent in Sydney Mid West followed by 11 per cent in Melbourne Outer North and Adelaide North. Manufacturing is also important in some of the independent cities – 12 per cent of income in NT Darwin associated with a surge of construction – and in a few agricultural regions (remember that we here exclude food processing, which is widespread in agricultural regions). It is of small importance in core metropolitan regions and in the ACT and generally moderate importance in the lifestyle regions.

Electricity, gas, water supply and sewerage

The public utilities are trade-sheltered. There is no way to export or import electricity and no practical way to import or export water. Gas has been exported from WA for some time and is now also exported from the East Coast – for the effects of this see the Energy chapter in this report. However, gas reticulation is as trade-sheltered as ever. Import competition cannot be relied on to keep energy and water prices in check and prior to the neo-liberal era government ownership was used as a means of price control. In the neo-liberal era faith has been placed in an uneasy mixture of competition and regulation.

Public utility provision tends to accompany or follow local economic development, but can occasionally lead, as when investment in electricity production has attracted electricity-intensive metals processing. Per contra, lagging public utilities are a serious brake on local development.

The public utilities generate around 1 per cent of local income across Australia. During the land boom of the early 21st Century the income generated by them increased less rapidly than national average, but during the mining boom it rebounded. Because the industries are capital intensive they have traditionally paid high wages and hence yielded high local incomes per hour worked but there has recently been downwards pressure on the rate of earnings – the public utilities appear to be a case where low growth in income generated per hour worked has been traded off against an increase in hours worked.

There are noticeable interstate differences in average income generation in the public utilities, generally above national average in NSW and below average in Queensland and SA. Within states, income generated per hour worked is generally higher in the capital city than it is in the non-metropolitan regions.

The public utilities are a widespread source of income, though overall they contribute only 1-2 per cent. The main outlier region is Vic Gippsland, where electricity and gas supply generate 5 per cent of regional income.

Waste management and repairs

Waste management, cleaning, repairs and maintenance are here grouped because they are completely trade-sheltered but open, by and large, to small and medium business competition. The industry includes such areas as office cleaning, where intense competition between small businesses limits income growth. It accounted for over 3 per cent of national hours worked over the past quarter century. Hours worked grew well above national average in the early part of the 21st Century but stagnated along with the national average during the mining boom. The industry – some of which is under local government management – yields lower than average local income per hour worked and income growth has been slow.

By and large, local development planners can rely on the private sector (or on the public sector contracting out) to provide appropriate waste management and repair service support for the local economy.

Income generated per hour worked tends to be higher in the metropolitan centres than elsewhere, particularly in NSW. Sydney Northern Shores generates the highest average waste management income per hour in the country, which is 50 per cent over national average and also over the lowest income region in the state. In other states the state average is lower and the regional differences are less marked.

This industry serves mainly local demand, generates 2-4 per cent of income in virtually all other than core metropolitan regions, where it is less significant.

Construction

Construction is trade-sheltered, in that it can only be carried out in particular places. However, construction is a response to investment decisions and as such is highly trade-sensitive. In this sense it leads much of local economic development. Where projects are small and there are many of them, such as house construction in metropolitan areas, competition can be intense, but costs more easily get out of control due to limited competition for large-scale civil construction projects and limited competition in remote areas. In some times and places it has been found that local government ownership is an effective way of controlling costs, particularly by planning the workload.

Construction is a significant industry, accounting for 8 per cent of hours worked nationally, similar to manufacturing when smelting and food processing are excluded. Hours worked grew rapidly during the land boom of the early 21st Century and continued to grow during the mining boom, though at a reduced rate as metropolitan construction slackened off. Income generation per hour worked is very close to national average. During the metropolitan construction boom of the early 21st Century the industry average grew less rapidly than the national, but when construction shifted to remote mining-based regions during the mining boom it surged ahead.

Local income generated per hour worked has recently been high in WA and depressed in Tasmania. Within states, the highest income generation rates per hour worked tend to be in outer suburban regions and in those mining-based regions where investment in additional capacity is still under way.

As noted above, construction is the only industry which has neither international nor interregional exports. It moves round the country depending on where construction is required, and in 2016 generated high percentages of income in the following regions.

- WA mining-based regions due to civil works in the tail end of the mining boom.
- Outer suburban regions, especially the commuter suburbs of Perth (again in the tail end of the mining boom) but also around Melbourne and Brisbane and spilling from Adelaide into SA Fleurieu – noticeably less so on the Sydney fringe, thanks to the poor accessibility of employment from this fringe.

In 2016 construction yielded a low proportion of incomes earned in the following regions.

- Metropolitan core regions, where the industry is active but the incomes it generates are small in relation to the various knowledge-economy industries of these regions.
- The agriculture-based and lifestyle regions generally, and particularly in those in Tasmania.

Wholesale trade

Wholesale trade deals with international imports and exports, and to this extent is trade-exposed, however much of it is trade-sheltered in that it deals with the logistics of domestic trade. The industry is moderately capital-intensive – it requires substantial facilities in truck-accessible places – but barriers to entry are not insuperable and costs are controlled by competition. From a local economic development point of view, a modicum of local wholesale activity follows the development of regional export and import industries, but the industry is drawn to locations where land is low-cost relative to its accessibility advantages in dealing with containerised and palletised freight.

Wholesale trade is a substantial industry, accounting for around 6 per cent of hours worked and therefore comparable with agriculture. However, hours worked have been falling, doubtless due to the reorganisation of logistics to increase productivity. Reflecting this reorganisation, income generation per hour worked has been fairly high at around 20 per cent over national average. The rate of growth of income per hour worked was above national average during the early 21st Century but has since subsided. It is possible that the industry has been exploiting the profit opportunities available to a naturally trade-sheltered industry, but that these opportunities were not so readily available during the mining boom. Alternatively, it may be that industry profitability has attracted additional competition.

Rates of income generation per hour worked are fairly similar across regions, though there is a tendency for returns to be higher in metropolitan regions than they are outside the major cities.

Because it serves local needs, wholesale trade is a widespread source of income. It is most prominent in the commuter suburbs, where it is responsible for 5-12 per cent of income – the maximum of 12 per cent is reported in Sydney Mid West. The industry is well-nigh absent from the metropolitan core regions, while in the non-metropolitan regions it generally provides between 2 and 5 per cent of regional income.

Retail trade and other shopfront services

Economic activities which require face-to-face contact between the service provider and the consumer are trade-sheltered by this very requirement. However, the boundary between trade-sheltered and trade-exposed activity can shift, as described in the chapter in this report on the digital disruption of retail services. Across much of the industry competition, whether digital or from small business, limits profit margins but advertising and economies of scale create pockets of high profitability in areas such as mass retailing.

Local economic development planners can rely that retail services will follow local demand and have become reasonably expert in planning to capture local demand. In metropolitan areas such demand can easily commute outwards to other suburbs and similarly country towns have been losing demand to larger centres made accessible by fast roads. The shopfront services are very important for local community interaction and job generation; the downside is that the jobs they generate are mostly low-paid. Planners need to provide the basis on which people skilled in social interaction can run the pubs and other meeting places and make a living out of it.

Retail trade and other shopfront services like food services, hairdressing and live entertainment generated roughly 18 per cent of hours worked from 1992 to 2016. Hours worked grew at a little below the national average rate in the early 21st Century but have now begun to decline; however income generated per hour has continued to grow at a little under 2 per cent a year. Average income generated per hour worked is two-thirds of the national average. Though the industry includes a number of large businesses, much of its employment is entry-level and there are also many small businesses which earn low profits if they earn profits at all.

As with other industries where competition between small businesses is important, income generated per hour worked is highest in inner suburban regions (particularly those with high socio-economic status) and is low in agriculture-based and lifestyle regions.

The regions where retail trade contributes more than 20 per cent of income are commuter suburbs plus one independent city, NSW Central Coast – which in many ways resembles a commuter suburb. The suburbs where retailing is a major source of local earnings tend to be high-status and to lack industries such as manufacturing and wholesaling. In the lifestyle and agriculture-based regions retailing is responsible for 12-20 per cent of income while in the mining-based regions it generates 5-14 per cent of income.

Accommodation

Accommodation is a small industry, here separated from retail trade, food services and the like because of its direct relationship to tourism. Apart from its exposure to international tourism, the industry is trade-sheltered and shares many of the characteristics of the shopfront industries. It is highly competitive and planners can rely that businesses will respond to demand.

Accommodation has been responsible for a little over 1 per cent of hours worked. It experienced rapid growth during the early 21st Century but employment declined during the mining boom. Average income generated per hour worked appears to be the lowest of all industries, and has not been increasing, due presumably to the presence of low-profit small businesses. Income generated per hour worked is highest in the metropolitan centres (particularly Sydney) and low in lifestyle and agriculture-based regions.

The industry is widespread and is generally responsible for around 1 per cent of regional income. However, its presence identifies regions where tourism is important. Accommodation generates around 2 per cent of total income in most lifestyle regions.

Transport

Like wholesale trade, to which they are closely related, parts of the various transport industries are trade-exposed. The trade-exposed sectors include the international airlines and the airports at which they land and the carriers of international exports and imports. However, much of the industry is trade-sheltered, including commuter and other domestic passenger transport and domestic freight. The industry is competitive and barriers to entry to truck and bus operations are low; however economies of scale are important in other parts of the industry, including air, rail and sea transport and the operation of transport systems – hence many small truck and bus operators are contractors to larger organisations like state education departments.

Transport is another widespread industry and planners can rely that spun off from whatever is the local economic base. Transport is also a very important infrastructure investment and can be used to lead economic development.

The industry is responsible for around 4 per cent of hours worked and its share of hours worked has been growing gently. Average income generated per hour worked has been about 15 per cent below national average and has been growing at around national average rates. Income capture per hour worked is highest in the WA mining-based regions and in the inner suburbs of Sydney and Perth; it is significantly lower in agriculture-based regions.

The minimum contribution of transport to regional income is 2 per cent (mainly metropolitan core and some commuter regions) and typically 4-6 per cent in non-metropolitan regions. Its highest contribution to regional income is 23 per cent in Sydney Eastern Shores, which include Sydney airport.

Telecommunications, information, media and administrative support

The group of industries which centres on the collection, editing, transmission and dissemination of information includes infrastructure elements (especially telecommunications) which are trade-sheltered as well as elements, such as publishing, which are highly trade-exposed. The industry is in the throes of extensive digital disruption and in some aspects is highly competitive. Up till the 1980s the main infrastructure elements were government-operated. They were privatised in the hope of increasing efficiency, but competition has proved to be an inadequate substitute for long-term planning and patient government investment. Local planning for these industries faces conundrums, the chief of which are how to ensure that the regional infrastructure is adequate and how to ensure that the more competitive parts of the industry serve the local interest in community cohesion, rather than splintering the local community into groups which are in touch with their likes overseas but out of touch locally.

Telecommunications is a small, trade-sheltered infrastructure industry, accounting for less than 1 per cent of hours worked, with the number of hours falling by 1 per cent a year or more. The fall in hours worked has been accompanied by a rapid increase in income generated per hour worked. It appears that a low-paid workforce of linesmen is being replaced by a much smaller workforce with more engineers.

Other information and media-based activities provide over 4 per cent of hours worked and are increasing as a proportion of the national total. At 75 per cent above the national average, income generated per hour worked is the highest of all the industries listed in Table 3.2, though its rate of growth is a little slower than the national average rate. One wonders whether the industry is as competitive as it would have us believe.

Taking telecommunications and the other IT-based industries together, income capture is highest in some of the mining-based regions (maybe mining requires the support of small, high-paid IT workforces) but is also high in the metropolitan core regions and inner commuter suburbs. It tends to be low in agriculture-based and lifestyle regions.

This essentially knowledge-economy industry generates up to 21 per cent of income in the metropolitan core regions. It generates up to 11 per cent in commuter suburbs adjacent to the metropolitan core regions, while in non-metropolitan regions its contribution to regional income goes down to 3 per cent.

Finance and insurance

Finance and insurance like to present themselves as globally-competitive industries, and indeed their web of global connections supports this view. However they also benefit from substantial trade shelters, some of which are regulatory and some of which are due to customer relations – like the shopfront industries, they require personal interaction, at least when loans are being negotiated.

Though neo-liberal policy relies on competition to control costs in finance and insurance, competition has proved to be a weak instrument in that the industry benefits from considerable economies of scale. So far these economies have been enhanced by digital developments, though it is possible that further digital development may undermine the current dominant role of large and highly profit-oriented corporations.

Finance and insurance provided around 4 per cent of total hours worked over the last quarter century. The rate of growth of hours worked was a little below national average during the early 21st Century land boom but was a little higher during the mining boom. The industry pays well, and local income capture per hour worked is nearly 50 per cent above the national average and growing.

There appear to be a strong state differentials in income capture per hour worked in finance, with NSW dominating and Tasmania, WA and SA lagging. Within states, income capture is highest in the metropolitan core regions and inner commuter suburbs; it is low in agriculture-based regions and also in mining-based and most lifestyle regions.

Finance and insurance is responsible for 23 per cent of all income generated in Sydney Metropolitan Core and 20 per cent in the City of Melbourne; the proportion gets as high as 9 per cent in the adjacent inner-suburban commuter regions and also in the other metropolitan core regions; elsewhere it stays below 4 per cent and is generally 2-3 per cent.

Real estate

Real estate and rental services are a trade-sheltered but competitive industry. They account for a little over 1 per cent of hours worked nationally. Employment increased during the land-boom years of the early 21st Century but has since stagnated. Earnings are similar to national average but have been growing more rapidly.

A strong state pattern appears in income capture per hour in this industry; high in NSW and low in Tasmania and Queensland. Within states metropolitan regions (particularly the metropolitan core regions and inner suburbs) capture more per hour than the agriculture-based and lifestyle regions.

This small but widespread industry generates 3 per cent of regional income in two of the Sydney commuter suburbs. Elsewhere 1 per cent of income is general.

Professional and scientific services

Professional and scientific services are part of the interface between Australia and the world; their providers are generally in touch with their counterparts overseas and in the process are trade-exposed. However, they are also in personal contact with local customers and this provides an element of trade-shelter. The industry is competitive and income generated per hour worked is only 13 per cent over national average – not a great differential for an industry with heavy reliance on professional personnel. However, the income generation rate has been growing more rapidly than national average and employment has likewise been growing more rapidly.

As a knowledge-economy industry, professional and scientific services are tied to the centres of the knowledge economy, but they have outreach all over the country. An important consequence for local development planning is to ensure that local professional personnel have the contacts and ease of communication they require with the centres of the knowledge economy in Australia and overseas.

As explained in previous *State of the Regions* reports the knowledge economy thrives on the proximity of varied but like-minded people. It is accordingly responsible for 17 per cent of income generated in Sydney Metropolitan Core and 15 per cent in the City of Melbourne; more like 10 per cent in the other metropolitan core regions, tapering down to 3-4 per cent in the outer suburbs and indeed the non-metropolitan regions.

Public administration, justice and defence

It is hardly necessary to remark that public administration is trade-sheltered and that costs are controlled by elected parliaments and councils, not by competition. The quality of public administration is an important contributor to local prosperity. Corrupt administration is costly; prudent and wise administration confers benefits which last for generations. An important Australian

advantage has been the general competence of its public services and the public spirit of its politicians, as supported by a discerning public. It is important that these virtues be safeguarded and local government makes an important contribution, not only in its own right but in advocacy to ensure that other levels of government maintain standards.

The sector has been responsible for 6.5 per cent of hours worked and hours worked have increased a little more rapidly than national average. Regional income capture in public administration is high, roughly one-third more than the national average, but it has been growing relatively slowly. Income captured per hour worked is particularly high in the ACT, spilling over into the adjacent NSW Southern Tablelands region; it is also high in Sydney. It appears to be low in the NT, WA and Tasmania.

Such is the concentration of Commonwealth government employment in Canberra that public administration and defence account for 44 per cent of regional income. No other region approaches this reliance on public administration income, but there are several where the sector contributes 10 per cent of more of total income generated. These regions include the capital regions of three states (Tasmania South, Adelaide South and SEQ Brisbane) and regions with important defence installations, of which the four most prominent are NT Darwin, Qld Townsville NW, NT Lingiari and SEQ West Moreton.

Education

Schools serve children, rely heavily on government finance and are provided by a mixture of government education departments and non-profit organisations. At tertiary level students are much more mobile and the industry is trade-exposed; however it is again government-supported and provided largely by a mixture of public bodies and non-profit organisations.

Local development planners have an important advocacy role as they interact with their state-level counterparts and with the various non-profit providers to ensure provision of suitable education services in their regions.

Though it is a major employer of professionally qualified people, the average income generated in the education sector per hour worked is around the same as in the economy as a whole, and has been growing at around the same rate. The sector was responsible for around 6 per cent of total hours worked in the quarter century to 2016, and hours worked have been growing a little more rapidly than in the economy as a whole.

A state pattern applies in this industry, with income generated per hour worked high in NSW, the ACT and Victoria and low in the NT and in non-metropolitan WA. Reflecting the location of major tertiary institutions, average income generated is high in the metropolitan core regions and in suburban, independent-city and agriculture-based regions with significant universities.

Employment in education is widespread and generally account for around 10 per cent of regional income. This percentage is lower in regions with strong export incomes – the mining-based and core metropolitan regions; and generally higher in regions with weak export incomes. The percentage is highest in regions with significant tertiary education facilities and otherwise weak export incomes – NSW Northern Inland, Melbourne Inner East, Vic Geelong and NSW Illawarra are the prime examples. In NSW Northern Inland education generates 16 per cent of total income.

Medical and care services

Like education, medical and care services require personal contact, are largely government-financed and are provided by a mixture of public and private sector institutions. Most of the private-sector institutions are non-profit and even where provision is by nominally profit-making businesses an ethos of public service constrains profiteering. As in education, local development planners have an important advocacy role as they interact with their state and federal counterparts and with service providers to ensure provision of suitable services in their regions.

Medical and care services employ a mixture of professional and other staff and average income generated per hour worked is close to national average – probably higher in care services, where the proportion of professional personnel may be higher. Employment in hospitals and medical services has been growing more rapidly than the national average. Despite population ageing, employment in residential care and welfare services has been growing less rapidly – the baby-boom generation has yet to reach the age where extensive hostel and nursing home care is required, but will begin to do so in a decade or so.

A state pattern applies in this industry, with income generated per hour worked generally higher than national average in NSW and the ACT, and lower in Tasmania and Queensland. Within each state, income generation per hour tends to be slightly higher in the metropolitan regions than it is outside the metropolitan area.

Medical and care services are provided to all population groups, with high needs among small children and elderly people. The industry is widespread and accounts for around 13 per cent of income generated in the typical region. As with education the percentage is lower in regions with strong export incomes – mining-based regions and the core metropolitan centres of Sydney and Melbourne. The industry makes its highest contribution to total income in outer suburbs which have been favoured with health facilities (Sydney SE, Melbourne Outer South).

Gambling

In Tables 3.2 and 3.3 gambling is identified as a separate industry, not because of its size, which is miniscule whether measured by employment or by income generated, but because of its peculiar position as partly trade-exposed yet regulated; lying somewhere between entertainment and tax-collection. Income generated per hour worked in the industry rose rapidly during the land boom of the early 21st Century but fell during the mining boom, underlining the way in which the mining boom, whatever its effect on value added in the mining industry, was not nearly as roaring a boom at the household level as the land boom.

3.7 Conclusion

As local economic development personnel are only too aware, each industry has its location factors and requirements and much of the skill in regional economic strategy development lies in matching local assets with industry requirements and market demands. It's a competitive business, an innovative business, and what suits one region is unlikely to suit its neighbour. The fact that regional strategies will diverge means that diversified sources of finance will be important; financiers who understand particular industries and the combinations of industry which provide opportunities in particular regions and have available financial techniques which can deal with a wide range of levels of uncertainty.



4. Income transfers between regions including benefits

The discussion in Chapter 3 concentrated on incomes received by place of work. As mentioned in Chapter 1, many of these incomes accrue to households which live in the same region as they work in, but there are three main mechanisms by which these incomes can be shared by households in other regions. These mechanisms are:

- Commuting;
- Property income; and
- Cash benefits, financed by taxation.

We now consider these transfers.

4.1 Commuting at the regional level

Commuting, in the sense of travelling between home and work, has a long history. When the first permanent dwellings were built in the villages of the Middle East, the first commuters stepped forth daily to the fields. So long as people either commuted on foot or worked at home (it was customary for artisans to live over their workshops) the distances involved were not long and both production and consumption took place in the same small geographic area, the same community. However, the speed and affordable cost of mechanical transport now permit commuting between geographically separate workplaces and dwellings, between the places where workers produce goods and services and the places where they consume them. Again, people no longer confine their consumption to home, but travel for a great variety of purposes other than the journey to work.

4.1.1 The costs of commuting

All this travelling has its costs, both cash costs and time costs. In present-day Australia the cash costs of commuting are paid by the commuter. Any employer contribution to commuting costs (as distinct from travel on the job) is taxed as a fringe benefit, the major exception being fly-in fly-out transport to remote locations in Australia or overseas. Similarly non-work travel costs are borne by the traveller.

In 2009-10 households receiving wages or salaries, and therefore nearly all including commuters, on average spent \$243 a week on transport, while households receiving private incomes from business or investments, and therefore with a lower proportion of commuters, on average spent \$175 a week on transport. The difference amounts to approximately 5 per cent of total expenditure, or roughly one-third of household transport costs. This is a minimum estimate of the significance of cash expenditure on commuting, since the second group (households receiving incomes from their own businesses) would have included a proportion of commuters.

Time spent in commuting may also be regarded as a cost. In the 1960s the convention was adopted that work travel time should be valued at the worker's wage rate. This assumption was adopted in cost-benefit studies of transport investments, especially freeways. Minutes saved by faster freeway travel multiplied by the wage per minute yielded large estimates of benefit. The underlying assumptions were that trip origins and destinations would not change and that people would not switch from public transport to driving. Neither assumption was correct. The switch to driving added to traffic flow and reduced time savings, and the faster speeds allowed people to travel further in a

given time, extending average trip length. The benefit of speed in transport is accordingly to allow people to travel further.

So what, then, is the time cost of travel? Walking and cycling happen to be good exercise, and people who walk or cycle to work can argue that, if they did not get their exercise this way, they would have to spend equal time exercising in another way. Similarly public transport, especially if one gets a seat, allows one to read or interact with a smartphone. Car driving requires more attention, but can be enjoyable and even relaxing. On the other hand, there are limits to the extent to which time spent travelling can be spent in other ways.

The most recent survey of Australians' use of time dates from 2006. According to this survey, 6 per cent of paid employees worked at home (or at least, did not report time spent commuting). Among the men who travelled to work, the average one-way commuting time was 29 minutes, and 26 minutes for women. The average duration for full-time workers was a little longer – 36 minutes for men and 30 for women.

Why should people who work longer hours also travel longer hours to work? Those who work long hours do not, on average, trade these longer hours off against shorter times on the job. The relationship is the other way about. Those for whom work is an important part of their lives and seem to be willing to spend more time accessing it.

And what alternative activities do people forfeit by spending time travelling to work? We do not have any data specific to work travel time, but the time-use survey reports that 65 per cent of the women and 56 per cent of the men who are employed full-time 'always feel rushed for time'. The proportions for people not in the labour force are less than half of this. The activities forfeited depend on age and sex. On average, mothers of children aged under 15 who go to work find the time by spending less time on child care and domestic duties; fathers likewise curtail their domestic duties but otherwise cut back on TV watching and sleep. Among young people, work and education are alternative major uses of time. Apart from education, the major activities foregone in order to find time to work are sleep and various forms of recreation and (among the girls) child care. Those who go out to work do not on average cut back much on time spent socialising or in voluntary work, indeed young males extend it. It would seem, therefore, that paid work and social engagement are complementary and participation is compatible with the average allocation of time to work travel.

This said, long work travel times – say an hour or more each way if secondary activity like reading or snoozing is possible, and 45 minutes or more if concentrated attention is required, as in car driving – are indeed costly in terms of other activities foregone. NIEIR has found that the price of urban residential land is strongly correlated with the number of jobs available within travel time of up to an hour, using a shaded cut-off beginning at half an hour. This serves to define the labour catchment of a workplace, and the corresponding job catchment of a residence.

4.1.2 Commuter behaviour

Many commuter journeys cross LGA boundaries; in very few LGAs do all the resident workers work in the same LGA and in very few are all the local jobs taken by residents; in few LGAs do residents other than the very old or poor confine their social, shopping and entertainment expenditure to the LGA. The same lack of self-containment applies at the regional level and indeed at the international level. Europe, with its plethora of small countries and open borders, hosts a great deal of cross-border commuting while in countries such as the Philippines and India remittances by citizens who are working temporarily overseas are important elements in the balance of payments. Indeed, as Australian skilled workers and consultants gain contracts abroad and Australia issues visas to shortterm workers from abroad, international commuting is bolstering airline travel and international remittances are an increasing item in the Australian balance of payments. From a regional planning point of view:

- resident commuting to work in other regions can bring in income generated in those regions.
 In suburban regions this typically accounts for a large proportion of the economic base of the region; and
- non-resident commuting to work in the planner's own region may be welcome as an addition to labour supply, but may also be regarded as a leakage by which economic development initiatives benefit other regions rather than one's own.

Similar considerations apply to commuting to and from educational institutions, hospitals, places of entertainment and retail centres. One way or another, non-work travel redistributes a significant proportion of consumer expenditure from regions of residence to regions which provide services. There are regions where the economic base concentrates on the provision of services to residents of other regions, including tourism.

Concentrating on work commuting, workers can be divided into three groups.

- 1. Those who live and work in the same region. These can be subdivided into those who work at home (or live on the job) and those who commute to work within the region.
- 2. Those who live in one region and work in another, commuting to the workplace for each work session.
- 3. Those who live in one region and work in another but perform more than one work session between commutes.

These groups seem clear-cut, but it should be remembered that not everybody works permanently at a single location and similarly not everybody lives at a single location. Workers may hold multiple jobs located in different places and some jobs, or successions of jobs, involve activities in different places. Similarly there are people who live part of the time in one place and part-week or part-month or part-year in another. In the *State of the Regions* reports these differences are smoothed out by adopting Census definitions: people are assumed to live at their residential address as reported to the Census and work at the workplace address they reported to the Census, including imputed sign-on points for those with mobile jobs.

Over all Australia, we estimate that in 2016 workers were distributed as follows.

- 1. Work at home or live on the job: 4 per cent of all workers
- 2. Live and commute to work within the same SOR region: 61.2 per cent. (This proportion would reduce considerably if we focused down on individual LGAs rather than SOR regions.)
- 3. Work in a region which neighbours their region of residence (across one SOR regional boundary): 26.7 per cent.
- 4. Work in a non-neighbouring region but within the same metropolitan area (e.g. commute to Sydney metropolitan core from Sydney outer west): 5 per cent.
- 5. Work in a region which is neither neighbouring nor in the same metropolitan area (e.g. live in WA Peel SW but work in WA Pilbara Kimberley): 2.9 per cent.

The average length of commute will rise from group 1 to group 5; however the following should be borne in mind.

1. The size of regions varies considerably, and so therefore does the potential longest distance separating a home from a workplace within the region. This does not mean, though, that the average distance will be proportional to the size of the region: some relatively small metropolitan regions could easily have longer average internal commute distances than much larger non-metropolitan regions where journeys to work are dominated by short trips within country towns.

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- 2. Journeys to work between neighbouring regions can be very short one only needs to cross the boundary (e.g. Tweed Heads to Coolangatta, Wodonga to Albury). However, on average they are likely to be longer than the typical within-region journey to work.
- 3. At the scale of the SOR regions, only Sydney and Melbourne are large enough to have intrametropolitan journeys which cross an intervening region. With one exception, our metropolitan regions are at least 10 km across, hence this is the minimum commute distance for this class. (The exception involves Melbourne Inner East, which does not share a boundary with Melbourne City, but is separated from the City by 4 kms of Melbourne Inner North).
- 4. The minimum distance separating work from home for those who cross at least one non-metropolitan region would be at least 100 km (this being the minimum width of such a region) and in most cases much more. The group includes people who report living in one metropolitan area and working in another, or living in a suburban or hobby-farm region and working in a resource-based region. Travel is likely to be by air these are fly-in fly-out (FIFO) commuters. It is disputable whether the data capture all such commuters; this depends on how respondents have answered the Census questions. However, if the respondents' interpretations of the questions about where you live and work are similar from region to region, their answers permit reasonably accurate cross-regional comparisons of the significance of FIFO commuting.

4.1.3 Working at home and living on the job

The advantages of living and working on the same property include the avoidance of commuting costs, both time and cash, sometimes further savings through the sharing of overheads and also the capacity to switch from work to home concerns at zero notice. A broad distinction can be made between working at home, where the primary purpose of the property is residential, and living on the job, where the primary purpose of the property is non-residential.

People who work at home are generally in occupations that do not require the presence of coworkers or any large number of customers – if space has to be found for co-workers or customers, the home quickly becomes a place of business. However it is normal for other family members to be present, and indeed the reason why a person may want to work at home is quite often to be available to meet the needs of these other family members as they arise. Working at home can include piece-work in manufacturing industries and work in various secretarial and similar services. It frequently extends to working from home, where home is a base but the actual work is performed elsewhere, as is common in repair, cleaning and maintenance services. It is frequently argued that improvements in telecommunications have increased the number of jobs that can be performed at home, at least part of the time – attendance at a central office or workshop may still be necessary on and off.

Those who live on the job enjoy various kinds of housing, ranging from flats built into business premises to freestanding houses and gardens located on business property. Reasons for living on the job include the following.

- The employer provides the housing and finds it convenient to locate it on the same property as the business premises. This was a common reason for employer provision in country towns – the employer provided accommodation a part of a career package which involved movement between various country locations.
- The employed person has to be available to take emergency action at all times. The alternative here is to arrange shift work, so that somebody is on duty throughout the day and night, but this is an option only in large organisations, and plenty of workers in country towns live on the job in order to provide out-of-hours service think of police, doctors, publicans, ministers and the like, not to speak of caretakers.

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 Geography can also play a role – farmers tend to live on the farm not only to be there to deal with emergencies as they arise but to avoid long commuting times and costs.

These reasons for living on the job are becoming less compelling. Fringe benefits taxation discourages employer provision of accommodation and the tax concessions for home ownership encourage the separation of residential accommodation from business premises. Improvements in telecommunications and transport can substitute for physical presence at particular locations while increases in the scale of operations can allow off-site shift workers to substitute for live-in workers. The proportion of workers who live on the job may also decline due to reductions in the proportion employed in industries where it is usual to live on the job.

4.1.4 Commuters

Those workers who do not work at home, or work from home, or live on the job, constitute the great majority – at the 2011 Census 96 per cent of the working population. Many journeys to work cross LGA boundaries and create potential divergences between the work incomes paid out by employers within the LGA and work incomes earned by residents of the LGA. Though Council economic development practitioners are primarily interested in commuter flows across the borders of their particular LGA, in this report we broaden out to flows across the borders of the SOR regions. Much the same methodology can be applied at the LGA level, but the detail tends to become very location-specific and hence to obscure broad patterns.

At the regional level, in roughly half of all regions the number of jobs more or less balances against the number of resident workers; in a little over a quarter the number available exceeds the number of resident workers by more than 4 per cent, and in a little over a half the number available is less than the number of resident workers. This means that jobs are more geographically concentrated than workers' dwellings. The number of jobs available exceeds the number of resident workers by four per cent or more in the following types of region.

- Most obviously, in the core metropolitan regions: Sydney, Melbourne, Brisbane, Adelaide, Perth and also in the ACT. In smaller cities this would apply at the LGA level but Hobart, Darwin and other independent cities are too small to generate job surpluses for their regions.
- In five resource-based regions WA Pilbara Kimberley, NT Lingiari, WA Gascoyne Goldfields, SA Far North and West and Qld Mackay. These regions generally attract long-distance commuters, as discussed below.
- In three suburban regions lying in the two largest metropolitan areas: Sydney Parramatta Ryde, Melbourne Inner Eastern suburbs and Melbourne Inner Southern suburbs.

The actual regions identified are sensitive to the way regional boundaries are drawn – different boundaries could easily change the number of suburban regions in the list. However it remains that, at the scale of SOR regions, few suburban regions have more jobs than working residents, and all these are inner or middle rather than outer suburbs.

The number of jobs is less than the number of resident workers in the following types of region.

- Most metropolitan suburban regions most inner suburbs and all outer suburbs.
- Peri-metropolitan regions regions bordering the metropolitan areas. Generally part of the region is within commuting distance, if not of the metropolitan centre, then at least of jobs in the outer suburbs. The regions concerned include NSW Southern Tablelands, which supplies commuters to the ACT, NSW Inland Hunter, from which commuters travel to Coastal Hunter, and NSW Northern Rivers, from which commuters travel to the Gold Coast and Brisbane.

 Source regions for commuting to adjacent non-metropolitan regions. These include NT Darwin (to NT Lingiari) and Qld Wide Bay Burnett (both north towards Gladstone and south into the Sunshine Coast).

The remaining regions, where employment numbers more or less balance against the resident workforce, include the three Tasmanian regions, SA East, Vic Gippsland and much of NSW and Queensland.

If a region hosts more jobs than it has resident workers, it will attract a net inflow of commuters, and the other way about. Thus the core metropolitan regions and the mining-based regions attract net inflows. Where the metropolitan core region is tightly defined, as it is in Sydney and Melbourne, the net inflow of workers is several times the resident population of workers while in suburban commuter regions the net outflow can be as much as 40 per cent of resident workers. In regions where employment numbers balance against the resident workforce the net flow is zero, or close to it.

These net flows result from much larger gross flows, which happen because commuters cross regional boundaries in both directions. The proportion of workers who live and work in the same region (65 per cent) is considerably less than the proportion which could do so if everybody gave first priority to working close to home (85 per cent).

It is possible for regions where the number of jobs balances the number of resident workers to be self-contained, in that the great majority of the workforce works within the region and few jobs are taken by people who live elsewhere. This is true of the three Tasmanian regions – not only is there very little FIFO to or from Tasmania, there is very little commuting between the three Tasmanian regions. Similarly Qld Far North Torres is isolated from other regions so that 97 per cent of its resident workers work within the region and 99 per cent of the jobs in the region are taken by residents. Several of the NSW non-metropolitan regions also report high degrees of self-containment.

By contrast, NSW Murray Far West, which like most non-metropolitan non-resource regions has more or less the same number of jobs as it has resident workers, is far from self-contained: only 80 per cent of its workers work within the region and only 80 per cent of its jobs are taken by residents. The reason is the state boundary which separates the region from Vic Hume and Vic Loddon Mallee. There is substantial commuter traffic across this boundary. Outside the metropolitan areas, most SOR boundaries respect the hinterlands of the major provincial cities and towns; they are drawn as far as possible around the edges of hinterlands and thereby minimise cross-border commuting. However, state boundaries (which of necessity are regional boundaries, to ensure that SOR regions can be added to state totals) can split towns and hinterlands – chiefly the boundary of NSW, which as the mother colony ensured that its political boundaries would be larger than the hinterland of Sydney. The regions mainly affected are the three regions adjoining the Murray River, and NSW Northern Rivers and SEQ Gold Coast, split by a surveyed line which wanders through the back streets of Coolangatta. Councils and planners in these regions are acutely conscious of these mismatches between political and economic allegiance and of the ways in which cross-border cooperation at local government level is necessary to overcome cross-purposes at the state level.

Other agriculture-based regions which generate outward commuter traffic lie in the peri-urban regions of the major metropolitan cities. Thus one-third of the residents of NSW Southern Tablelands work outside the region, chiefly in the ACT but also in Sydney; but there are also reverse commuter flows, with 13 per cent of jobs in the region taken by non-residents. Elsewhere in NSW, around 95 per cent of the jobs available in Central Coast and Illawarra are taken by residents, but 20-30 per cent of resident workers commute outwards. Coastal Hunter attracts a net flow of commuters from Inland Hunter, but even so 20 per cent of jobs in Inland Hunter are taken by non-residents.

In Victoria, Gippsland is cut off from the other non-metropolitan regions by hills and is separated from the major employment areas of metropolitan Melbourne by the Melbourne Outer South region, which is seriously short of jobs. As a result it is much more self-contained than the other Victorian non-metropolitan regions, in which 90 per cent of the jobs available are taken by residents (85 per cent for Geelong) but 15 per cent of residents work outside the region (20 per cent for Geelong).

In SEQ, Gold Coast receives commuters from NSW Northern Rivers and sends them to Brisbane; residents take 89 per cent of its jobs but 18 per cent of them work outside the region. The Sunshine Coast is a little more self-contained but 13 per cent of its working residents are commuters.

In SA, Fleurieu and the North are both on the fringes of Adelaide with substantial commuter flows inbound partly balanced by outbound flows. The same is true for WA Wheatbelt Great Southern and WA Peel SW, on the fringes of Perth.

The mining-based regions generate very little outbound commuting, so that 97 per cent or more of their residents work within the region. However, thanks to inbound FIFO commuting, the proportion of jobs taken by residents is less; as low as two-thirds in WA Pilbara Kimberley.

In the core metropolitan regions, where the number of jobs within the region greatly exceeds the number of resident workers, there are plenty of opportunities to work within the region, but even so a substantial minority of residents commutes outwards to jobs located elsewhere in the metropolitan area – this contra-peak flow accounts for one-third of resident workers in the City of Melbourne and a quarter of those in Sydney Metropolitan Core.

In outer suburban regions around three-quarters of the jobs available are taken by local residents, but because the number of jobs in the region is less than the number of workers these locally-working residents account for half or less of the resident worker population. An interesting exception to this generalisation is that only half the jobs available in Melbourne Outer North are taken by residents of the region. This region receives substantial contra-peak commuter flows from Melbourne Inner North and crosstown flows from Melbourne West.

The middle suburban regions are notable for high levels of commuting both in and out. They include regions like Sydney Parramatta Ryde which receive net inflows, and regions like Sydney Near West which generate net outflows. In both cases, the proportion of resident workers who work within the region is low – generally about a third, but as low as one-quarter in Sydney Near West. The remaining two-thirds – three quarters in Sydney Near West – work elsewhere in the metropolitan area. The general tendency is for residents of these suburbs to work in the metropolitan centre while local jobs are taken by people who live further out – the proportion of jobs taken by locals is again around one-third. The result is a substantial disconnect between the producer economy of these regions and the residential economy.

Regions in which FIFO travel accounts for 2 per cent or more of working residents (up to a maximum of 4 per cent in WA Peel SW) are as follows.

- In Queensland, Wide Bay Burnett, Sunshine Coast, Gold Coast, Brisbane, Moreton Bay and Far North Torres.
- In NSW, South Coast.
- In SA, Adelaide North (with a long-distance flow to SA Far North).
- In WA, Peel SW, Wheatbelt Great Southern and all of Perth, particularly the outer suburbs.

Very few Tasmanian residents engage in FIFO employment, and the Victorians who do so are mostly residents of Melbourne suburbs where they form 1 per cent or so of the working population. It is easy to see how Perth and its periphery, to a lesser extent Brisbane and its periphery, and to an even lesser extent Adelaide, have been dependent on activity in the resource regions – mainly the resource regions of their own states.

Commuting occasions travel costs (both time and money) and it is therefore to be expected that these will be compensated by higher earnings and that the longer the commute, the greater the wage. On average, commuters who cross region boundaries earn 5 per cent more per week than those who work within their region of residence. Though this applies in the average region, there are variations which are documented in these reports as differences between average regional earnings on a place of work basis and average earnings on a residential basis. For most regions, because longer-distance commuters earn more than short-distance, the average earnings of the residents of a region exceed average place-of-work earnings received in the region. However, this is not true in all regions. In regions with small numbers of outbound commuters, and where such outbound commuters as there are tend to take low-paid or short-hours jobs, the average incomes of residents can be less than the average incomes earned at places of work within the region. Examples include:

- WA Gascoyne Goldfields, NT Lingiari and to a lesser extent other mining-based regions, where the resident population includes a proportion of low-paid Aboriginal workers and there are many high-paid inbound commuters;
- Melbourne City and (perhaps) NSW Northern Inland, where the resident population includes large numbers of low-paid students; and
- Adelaide North, Melbourne Outer North and Sydney Mid West, where the resident population includes a large proportion of outbound commuters but they tend to be less well paid than inbound commuters to these regions.

At the opposite extreme, regions whose outbound resident commuters are much better paid than people who work locally include the Sydney Outer North and Eastern Shores – high status suburbs where local employment tends to be in relatively low-paid service occupations. The difference in social status from neighbouring regions does not have to be particularly marked for this effect to occur; thus SEQ Logan Redland and SEQ Moreton Bay tend to have lower-paid local jobs than those taken by commuters to Brisbane.

We have already identified regions where there is little cross-border commuting either in or out; naturally these regions are self-contained in that incomes earned in the region stay within the region; they are paid out to residents. There are also regions where inbound commuter flows more or less balance against outbound: NSW Murray Far West is notable in that roughly 20 per cent of the incomes earned within the region are received by people who work on the other bank of the Murray, balanced by a similar flow of people who work in the region but live in Victoria. A similar position applies in Sydney Parramatta-Ryde, where the number of jobs comes close to balancing against the number of resident workforce commutes to other regions, chiefly Sydney Metropolitan Core, and three quarters of the jobs in the region are taken by commuters who live elsewhere, particularly in Sydney Outer Northern Shores and Sydney Outer West.

We have established above that net commuter flows tend to be from suburbs and metropolitan peripheries to the metropolitan centres and mining-based regions, the latter reached by FIFO. The result is that outbound commuting tends to be negligible in the self-contained rural regions and also in FIFO destination regions. In metropolitan periphery regions with access to a metropolitan area up to 15 per cent of the residents' earned income can flow in from outside the region, part-balanced by reverse commuters who account for maybe 5 per cent of the income generated in the region. Within the metropolitan areas, the central core regions are heavily dependent on the suburbs for labour supply and the suburbs, particularly the inner suburbs, are correspondingly dependent on the core region for income. Outer suburbs tend to depend on cross-border commuting for around half their earned income. Typically around 70 per cent of the incomes generated in these suburbs go to local residents. This eases the burden of commuting.



4.1.5 Net flows of earned income

Interregional flows of commuters are matched by flows of earned income. Offsetting contrary flows (e.g. subtracting the flow carried by CBD residents who work in the suburbs from the larger flow in the opposite direction) we find as follows.

Metropolitan areas: from the central city to the suburbs: exceptions; in Melbourne Inner East is fairly balanced; in Sydney Parramatta Bankstown generates a net outward flow.

Non-metropolitan areas: there is a net flow outwards from mining-based regions; generally net inwards elsewhere, especially into peri-metropolitan regions which often include commuter outskirts (WA Peel SW, SA Fleurieu, NSW southern inland) or provincial cities with commuting to a metropolitan centre (e.g. Vic Grampians).

This basic pattern has not changed since 1996, indeed probably since well before 1996. The major changes 1996-2016 have been:

- in Sydney, reduced net outflow of commuter earnings from Parramatta and the Mid West, resulting in increased net long-distance flows of commuter earnings from Sydney Central to Outer West and Outer South West and increased net short-distance flow from Sydney Central to the Near West;
- in Melbourne, similarly but not as marked, increased net dependence on commuting in Inner South (which includes Dandenong); also in Inner North; and
- in SEQ, Gold Coast has gone from a net outflow of commuter earnings to a net inflow with increased commuting to Brisbane. (This would be related to growing use of the Gold Coast railway line.)

4.1.6 Resident average earnings versus place of work average earnings

There is a general tendency for resident average earnings to exceed place-of-work average earnings, because longer-distance commuters tend to be paid more than short-distance commuters, if only to cover additional travel costs.

The difference between resident average earnings and place-of-work average earnings is particularly high in suburban commuter regions, where the local jobs are heavily weighted towards service industries while the commuter jobs are weighted towards highly-paid city-centre jobs. This is particularly noticeable in Sydney Outer North, Sydney Eastern Beaches and Sydney Northern Beaches. The difference also occurs, more mildly, in Melbourne (especially Inner South), and more mildly again in SEQ, Perth and the ACT/NSW Southern Tablelands. Outside the metropolitan areas, average resident earnings exceed average place-of-work earnings by 8 per cent or so in SA Fleurieu (much of which would be due to commuting to Adelaide) and in Qld Wide Bay Burnett, presumably due to commuting to the resource regions. The general pattern is for resident average earnings to exceed place-of-work average earnings by a couple of percentage points, depending on the extent to which the region is affected by commuting – in regions with very little commuting in or out the two measures converge, as is generally true in Tasmania.

Conversely, in a limited number of regions average place-of-work earnings are higher than average resident earnings. In 2016 two types of region were in this position:

- Mining-based regions, where high-paying jobs are taken by FIFO commuters while the lowpaying jobs tend to go to residents; and
- Manufacturing regions, where the high-paying jobs are taken by non-residents.

This pattern was noticeable both in 1996 and in 2016. Over the two decades there were several noticeable changes.

- In Sydney, the Near West gentrified from a manufacturing-type region in which resident average earnings were less than place-of-work average earnings to the reverse.
- In Melbourne, a similar change occurred with the gentrification of the Inner North. Conversely, however, in the City of Melbourne resident average earnings sank below place-of-work average earnings, a new phenomenon associated, not with manufacturing but with a high resident population of students and other young people.
- In South Australia three regions Adelaide North, SA North and SA Far North and West which in 1996 had experienced a mild manufacturing-type excess of place-of-work earnings over resident earnings moved towards the more usual position of a small excess of resident earnings over place-of-work earnings.

4.2 Property income

Property income derives from the ownership of assets which yield dividends, interest or cash rents. It excludes the capital return element of mixed income, while income from superannuation is not included until it is received in cash. Imputed income from owner-occupied dwellings is excluded from property income but included in GRP and is also included in disposable income to give an indicator of standard of living.

The significance of property income can be assessed by relating it to total household income. Over the country as a whole it accounted for 14.7 per cent of gross household income in 2016. In 2016-17 the contribution of property income was again highest in the ACT – Canberra increasingly houses generously-superannuated former public servants. This was reflected in the very rapid growth of property incomes in the ACT over the past 15 years –doubling in the period – as the cohort of public servants recruited in the 1970s retired onto superannuation and elected to stay in Canberra.

Over the fifteen years to 2017, property income per capita grew at an average annual rate double that of disposable income per capita. It grew particularly rapidly during the land boom (7.1 per cent a year, per capita) but was far more subdued after the GFC reflecting the low rate of growth in the latter period and the low interest rates adopted to encourage businesses to invest, not only in Australia but world-wide. In the period 2015 to 2017 growth in property income has risen by around 0.5 per cent per annum.

In the same way as last year reliance on property income in the ACT was followed by the wealthy parts of Sydney, particularly the Sydney Metropolitan Core, Sydney Eastern Shores and Sydney Outer Northern Shores. However, over the past 15 years these regions no more than kept their position and may well be overtaken by SEQ Brisbane City. Of the top ten regions for this indicator in 2016-17 property incomes per capita had declined marginally in five regions, namely the ACT, Sydney Outer Northern Shores, NT Darwin, Perth Central and Melbourne Southern Inner. Growth in the remaining five was slim.

Melbourne Inner South and Melbourne Inner East received property contributions of 16 to 17 per cent of disposable income, similar to Sydney Outer North and again with average to low rates of growth. Reflecting the end of the mining investment boom and the highly paid employment it created, property income per capita has declined.

The contribution of property to disposable income was generally lower in three types of region.

 Mining regions, where earnings were high and accumulated savings low. (In these regions the proportion of income saved can be high, but what matters for property incomes is past saving including inherited savings.) Outer metropolitan regions, such as Sydney Outer South West, where residents were struggling with mortgages and had few income-yielding savings. There were such regions on the edge of every metropolis except Canberra, with the contribution of property to disposable income going as low as 10 per cent in QLD Townsville North West which has the lowest property per capita income of all regions.

Table 4.1 Property income per capita – Top 10 high and low regions (\$cvm)										
SOR name	2001	2006	2010	2011	2012	2013	2014	2015	2016	2017
High regions										
ACT	11284	15473	20451	22426	22837	22812	21702	22867	23034	22954
Sydney Metropolitan Core	8914	11013	12751	13387	12752	12080	11727	11695	11609	11632
Sydney Eastern Shores	8068	10059	11590	12309	11647	10942	11156	11022	10869	10945
Sydney Outer Northern Shores	8032	9677	10788	11604	11188	10384	10411	10180	10168	9967
SEQ Brisbane City	5872	8246	9874	10643	10386	9649	9691	9830	9876	9938
NT Darwin	5496	7785	9546	10235	10230	9526	9441	9840	9858	9634
Perth Central	5115	7239	9555	10165	10024	9280	9277	9198	9133	9036
Sydney Near West	5174	6946	7711	8722	8804	8179	8524	8555	8662	8693
Melbourne Eastern Inner	6054	7334	8261	9108	8968	8432	8149	8114	8288	8322
Melbourne Southern Inner	6290	7577	8921	9631	9231	8462	8435	8189	8255	8199
Low regions										
NT Lingiari	3262	3859	4623	4727	4740	4425	4643	4531	4646	4909
SEQ Moreton Bay	2871	3874	4555	4992	4878	4541	4583	4739	4751	4876
SEQ West Moreton	2853	3935	4584	5064	5016	4649	4738	4765	4833	4828
Sydney Outer South West	3097	3987	4329	4870	4881	4546	4696	4814	4795	4791
QLD Wide Bay Burnett	2760	4138	4537	4954	4975	4641	4466	4411	4606	4750
QLD Darling Downs South West	2816	3920	4248	4662	4835	4575	4422	4333	4484	4721
Melbourne Northern Outer	3068	3740	4396	4936	4908	4551	4503	4557	4535	4558
QLD Far North Torres	2920	4043	4492	4950	4952	4644	4251	4228	4302	4482
SEQ Logan Redland	2640	3720	4382	4773	4667	4212	4157	4154	4217	4327
QLD Townsville North West	2618	3770	4253	4871	4783	4285	4151	4182	4079	4149
Australia	4286	5618	6552	7179	7117	6695	6677	6738	6771	6814

Regions where the population had a high proportion of Indigenous people.



4.3 Cash benefits

The Australian social security system provides a comprehensive range of pensions and benefits. The age pension is a prominent part of the range but disability pensions are also important along with payments to unemployed people. In 2017 cash benefits provided 12.2 per cent of household disposable income and offset 70 per cent of income taxes raised.

As originally designed the system provided a minimum income for most citizens, but this offended the advocates of free bargaining in the labour market. To sharpen the incentive to work, the nexus between unemployment benefits and the age pension (which prior to the 1980s were paid at the same rate through subject to different means tests) was broken and the safety net for young people is now well below that for the elderly and is also well below the poverty line, however that is drawn. The failure to maintain the real value of unemployment benefits has further disadvantaged the residents of already-disadvantaged regions, though it may have raised employment in low-productivity industries in these regions.

The tables in Appendix 1 and Table 4.2 include Cash Benefits per capita. In 2017 the average benefit per capita was \$5,634 per annum per person, a slight decrease over the previous year. Region by region several factors appear to influence the pattern. The highest per capita level of cash benefits in 2016-17 was in NSW Northern Inland at \$10,270 per annum per person followed by NSW North Coast at \$9,486 and NSW South Coast at \$9,453. The lowest level of benefits per capita were in NT Darwin at \$2,059, WA Pilbara Kimberley at \$2,028 per capita per annum and the Melbourne City at \$1,374. Three factors drive social-security take-up rates.

The tables in Appendix 1 include the take-up rate for unemployment-related social security payments by people of workforce age. In 2017 the average national social security take-up rate for people of workforce age was 11.7 per cent, a slight decrease over the previous year. Region by region several factors appear to influence the pattern. The highest take-up rate per capita in 2016-17 was in NT Lingiari at 26.1 per cent followed by QLD Wide Bay Burnett at 25.9 per cent and NSW North Coast at 22.8 per cent. The lowest take-up rate per capita were in Sydney Outer Northern Shores at 3.2 per cent, Melbourne City at 4.2 per cent and the Sydney Metropolitan Core at 4.6 per cent. Three factors drive social-security take-up rates.

Three factors drive social-security take-up rates.

- Job availability: the greater the availability, the less the take-up rate.
- Housing costs: unemployed people leave regions where they cannot afford housing costs, so reducing take-up in regions with high housing costs and increasing it in regions with low costs.
- The attractiveness of the region to early retirees and other people on low incomes: the chief attractor appears to be beaches but there is also high take-up in Aboriginal homelands (see Chapter 5, Indigenous employment).

Take-up rates are also high in regions undergoing economic restructuring. In 2016 the following regions were among those with high social security uptake among people of workforce age.

- Social security take-up has long been high in the retirement regions on the NSW coast. Coastal regions of New South Wales including NSW North 22.8 per cent and South Coast, 20.2 per cent.
- In rural regions facing farm consolidation and stagnation of employment opportunities, NSW Northern Inland, 19.1 per cent, NSW Murray Far West at 17.4 per cent.
- In regions where the small and, as it turns out, temporary employment boost from the mining boom was never enough to yield jobs to counterbalance the decline of manufacturing in the region.

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- QLD Wide Bay Burnett continues to face difficulties with its combination of job shortages and attractiveness to people with low incomes, due in part to comparatively affordable housing costs.
- VIC Gippsland, 19.0 per cent, a diverse region facing a range of features that contribute to the relatively high social security take-up rate including attractiveness of the coast to early retirees, particular problems relating to the dairy industry, sector employment which remains heavily reliant on brown coal and debates around the sustainability of the forestry industry.

Over the last five years the highest level of increase in the workforce-age social security take-up rate has been in QLD Mackay with a 3.5 percentage point increase, followed by QLD Fitzroy Central West at 3.2 percentage point increase and WA Gascoyne Goldfields at 2.8 per cent.

Social security take-up rates are high for people of pension age. When age pensions are added to payments to people of workforce age, demography dominates. At the other extreme, cash benefits per capita are high in some coastal regions, mainly due to their large number of age pensioners.

Table 4.2 Cash benefits per capita – Top 10 high and low regions (\$cvm)										
SOR name	2001	2006	2010	2011	2012	2013	2014	2015	2016	2017
High regions										
NSW Northern Inland	7594	8334	6963	7640	8083	8463	8587	9514	10165	10270
NSW North Coast	8163	8295	7216	9275	9572	9670	10073	10128	9938	9486
NSW South Coast	6932	6931	6655	9306	9779	9856	10139	10135	9948	9453
NSW Murray Far West	6306	8018	11069	7893	8460	8729	9170	9446	9601	9385
SA Fleurieu	4886	4950	4915	7871	8226	8671	8945	9099	9345	9091
SA East	5393	6054	9561	7415	7554	7926	8128	8611	9040	9006
QLD Darling Downs South West	4165	6069	5749	7158	7185	7216	7266	8018	8579	8902
QLD Wide Bay Burnett	6093	6975	6868	8276	8253	8234	8023	8468	8743	8599
SA North	5481	5714	7065	7608	7661	7974	8521	8645	8700	8527
NSW Orana	7234	9170	8222	7215	7522	7687	7860	8340	8636	8514
Low regions										
Melbourne Western	4558	5020	5549	4402	4159	4057	4179	4193	4105	3994
Perth Central	4569	5127	4686	4275	4276	4073	3896	3847	3901	3823
Sydney Eastern Shores	3257	3343	3978	3913	4187	4262	4267	4070	3962	3664
Sydney Near West	3717	3699	4498	3489	3764	3881	3947	3890	3871	3663
NT Lingiari	3359	3620	2963	1932	1999	1682	1403	1540	2266	2959
Sydney Metropolitan Core	3307	3460	4313	2636	2959	2916	2972	2799	2726	2508
ACT	3265	2390	1973	2194	2462	2451	2462	2481	2471	2367
NT Darwin	2681	2284	2548	3210	2796	2304	2016	2004	1999	2059
WA Pilbara Kimberley	5491	6223	5370	1552	1618	1515	1476	1627	1848	2028
Melbourne City	5622	5282	5604	1839	1856	1546	1583	1531	1450	1374
Australia	4639	5026	5488	5648	5742	5728	5891	5877	5835	5634

4.4 Disposable income

Disposable income is calculated by adding cash income (wages, mixed income, property income, social security benefits, income from dwelling ownership) and subtracting income taxes and debt service costs, chiefly mortgage interest. In 2016-17 it averaged \$46,200 per annum per person.

Figure 4.3 shows that in 2016-17 the ACT still had the highest level of per capita disposable income at \$79,714, although this had declined from its peak in 2013 of \$85,764, possibly because of increasing housing costs. Yet again five of the top ten disposable income per capita regions in 2016-17 were Sydney regions, the highest at \$68,847 was Sydney Metropolitan Core.

As in the recent past, the resource-dominated regions continued the story of high mining-related salaries in remote regions. For WA Pilbara Kimberley 2017 estimates show per capita disposable income is trending upwards again after declines in the last few years. NT Darwin continued to perform strongly, ranked at number five for this indicator with per capita disposable income of \$61,196 in 2017. Given the tightening of employment opportunities in Darwin disposable income may come under pressure over the next year or two.

Once again the lowest level of per capita disposable income in 2016-17 was in QLD Wide Bay Burnett at \$34,261 and Queensland regions continue to occupy four places in the bottom ten regions for this indicator. QLD Far North Torres, with its population of Aboriginal and Torres Strait Islander peoples, is in the bottom ten regions once more with per capita disposable income of \$37,772.

The growth regions of Melbourne Outer North and Melbourne Western also remain in the bottom ten regions with per capita disposable income of \$36,809 and \$38,416 respectively. Each of these Melbourne regions had per capita disposable income that is about half of that in the ACT. For the Melbourne growth regions debt servicing costs demonstrate their impact on the local economy.

Table 4.3 Disposable income per capita – Top 10 high and low regions (\$cvm)										
SOR name	2001	2006	2010	2011	2012	2013	2014	2015	2016	2017
High regions										
ACT	51148	60967	76165	80999	83633	85764	81098	78836	79325	79714
Sydney Metropolitan Core	60328	63698	69622	68253	69084	68363	70318	69217	69798	68847
Sydney Eastern Shores	48517	53419	59053	61374	61895	60627	64522	64142	63948	63420
Sydney Outer Northern Shores	49063	51173	56032	60363	61638	60353	62855	62497	63172	62176
NT Darwin	39700	51714	60092	62075	60914	59219	61202	61999	62745	61196
WA Pilbara Kimberley	37368	41970	54476	58065	60693	61033	63427	62642	60135	60921
Sydney Near West	43978	48257	52505	54440	56363	55740	58705	59673	60780	60495
WA Wheatbelt Great Southern	36923	43446	45763	46824	54038	54718	55670	56662	54490	57760
VIC South West	32820	38038	45310	44880	45525	45769	46955	46909	47866	54815
Sydney South East	40786	42730	46418	50499	52256	51391	53235	53389	54151	53688
Low regions										
TAS Hobart South	25320	33524	38852	38750	38083	36664	37730	39253	39538	39127
TAS North	26274	33493	37984	37804	37854	36402	37538	38718	38878	38712
Melbourne Western	29674	33562	37020	37187	37034	37113	37691	37817	38142	38416
QLD Far North Torres	32871	40353	42387	40350	40150	39096	37154	37171	36942	37772
Adelaide North	27321	31465	36175	37262	37093	36628	37940	39027	38906	37440
Sydney Mid West	29276	30861	33373	34085	34661	33963	35863	36686	37331	37045
Melbourne Northern Outer	28476	31484	34808	35334	35446	35060	35344	35443	35731	36809
SEQ Logan Redland	27719	33142	38297	39334	38629	37178	36625	36492	36202	36388
SEQ West Moreton	26050	31928	36273	37950	37591	36658	36698	36804	36549	35742
QLD Wide Bay Burnett	25757	31652	33648	34739	34600	33991	32995	32968	33990	34261
Australia	33947	38784	43700	45231	45811	45203	45923	46163	46229	46247

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Table 4.4 shows that the pattern of incomes per household differs from that for incomes per capita because the average size of household varies by region.

In 2016-17 the ACT had the highest average household disposable income per annum at \$204,000 per household, the result of high wages, high property incomes and merely average interest payments. The ACT had benefited from two decades of solid growth in disposable income, which has declined slightly in the last year.

Five Sydney regions feature in the top ten, Sydney Outer Northern Shores, Sydney Eastern Shores, Sydney Near West, Sydney Metropolitan Core and Sydney South East. For Sydney regions, the highest average household disposable income was in Sydney Outer Northern Shores at \$187,000. Unlike the ACT they have experienced below-average income growth over the past 15 years and are now joined, by the resource regions of NT Darwin and WA Pilbara Kimberley, all of which experienced rapid growth in disposable incomes during the mining investment boom. NT Lingiari was this time in tenth position – here incomes per household are high relative to incomes per capita due to large number of individuals per household.

The bottom ten regions for this indicator in 2017 included three Tasmanian regions, TAS North, TAS Hobart South and TAS North West. Melbourne City has the lowest average household disposable income and should again be considered as a special case, largely because of the high proportion of single-person households, which include many students. QLD Wide Bay Burnett, which had the lowest average household disposable income in 2016 estimated now sits just above Melbourne City.

The ratio between the regions with the highest average household disposable income per annum and the lowest is approximately 2.6 times. So the differences are significant.

Table 4.4 Average household disposable income after debt service costs (\$cvm'000) – Top 10 high and low regions										
SOR name	2001	2006	2010	2011	2012	2013	2014	2015	2016	2017
High regions										
ACT	144	167	211	221	226	230	214	207	206	204
WA Pilbara Kimberley	136	164	216	229	238	233	227	215	203	198
Sydney Outer Northern Shores	147	151	168	182	186	183	191	190	190	187
NT Darwin	121	154	185	189	187	185	189	191	191	187
Sydney Eastern Shores	125	136	157	163	165	162	172	170	169	167
Sydney Near West	115	124	140	146	151	149	157	159	161	159
Sydney Metropolitan Core	133	141	158	156	158	156	160	158	158	156
WA Wheatbelt Great Southern	105	119	123	125	146	149	152	154	147	155
Sydney South East	117	120	133	145	150	148	154	153	154	153
NT Lingiari	145	167	181	174	164	154	148	137	139	148
Low regions										
SEQ West Moreton	75	92	106	111	110	108	109	109	107	105
NSW Northern Rivers	79	90	94	96	99	99	102	103	107	104
VIC Geelong	79	90	100	102	103	101	99	98	101	104
TAS North West	72	88	101	100	98	96	98	102	102	102
Adelaide North	72	81	95	97	97	97	101	104	103	99
NSW South Coast	74	84	92	98	100	98	101	102	104	99
TAS Hobart South	66	87	100	99	97	93	95	99	100	98
TAS North	69	88	99	98	97	93	95	97	97	96
QLD Wide Bay Burnett	69	85	89	92	92	90	87	87	89	89
Melbourne City	94	102	116	100	95	92	93	85	82	79
Australia	94	106	121	125	127	126	128	128	127	126



4.5 Conclusion

As has been the case for decades past, high-income inner suburban regions continue to report full employment. Canberra and inner Sydney continue to maintain both high employment and high incomes, aided in both cases by property incomes including generous superannuation.

Elsewhere in the country the employment and income position is decidedly patchy, with contrary trends. Thus unemployment is rising in regions which benefited from the mining boom and previously high-flying incomes received in these regions are declining. The adverse effects of the mining boom continue to play out in the manufacturing sector to the detriment of employment and incomes, particularly in many parts of SA and Victoria. The national failure to invest in broadband telecommunications, particularly in state-of-the-art upload speeds, is also delaying the shift into knowledge-based production as a substitute for employment in mining-related construction. However, there are signs of revival in tourism regions such as QLD Far North Torres.

There is cause for continuing concern about the capacity of the school education sector to minimise the number of students who leave school unequipped for participation in the world of work as it now faces them, and for concern about the capacity of the post-school education sector to keep up with the requirements of a rapidly changing economy. Local government should be watching closely to ensure that its local post-school education providers are integrated into local economic development strategies.

As noted in Chapter 3, most Australian regions spend more on international and interregional imports than they earn from international and interregional imports. The accounts are balanced in two ways:

- By interregional transfers of income and
- By borrowing both by the country at national scale and by residents at regional scale (chiefly household borrowing on mortgages, with a frightening proportion of the proceeds indirectly supporting consumption).

Interregional transfers of income are accomplished as follows.

- By commuting a major source of income in commuter regions but significant elsewhere (except in Tasmania). For regional planners this raises the important question of balance between investment in commuting infrastructure (to take advantage of the economies of agglomeration and knowledge in metropolitan centres) and investment to decentralise employment.
- By the distribution of property income. By its nature, this rewards people who have saved and invested and tends to favour the wealthy and the elderly.
- By provision of tax-financed services at universal standards, especially education and health services but including others, like recreation facilities. Indeed there is a strong case that equality of educational opportunity, and hence the full utilisation of the human potential of the next generation, requires over-provision of education services in low-income areas to counter the disadvantages of limited regional horizons.
- By taxes and social security payments. It is important that the system should support regional development, in particular by providing a safety net so that people who take risks on a region's behalf are not left bereft if their risk-taking is unsuccessful. By the rules of equity taxes should especially target unearned economic rents and support should be provided to young people making risky decisions on investment in skills.

The remaining regional imbalances are covered by borrowing and lending. Since financial deregulation lending to households has ballooned, with complex but generally in egalitarian effects. There is a need to redesign the financial system so that it better serves the general welfare rather than the short-term interests of the financial services industry.



5. Employment and skills

Debate about future employment in Australia has focussed on the impact of automation and digitisation on employment, not only in terms of skills, but in terms of job losses because labour productivity is increased by these processes. In this world lies both opportunity and uncertainty as well as the possibility of increasing inequality between and within regions. Amid the uncertainty industry sectors are changing as technology redefines markets and company structures. As an example, higher levels of automation in advanced manufacturing, in farming and in the mining industry are reducing labour demand and changing the types of skills employed. The Internet is central to these changes and poor standards of connectivity will constrain productivity improvements and entrepreneurships in many industries.

The 2016 State of the Regions report found that between 2014 and 2016 period, two thirds of Australia's economic growth occurred in the Sydney, Melbourne, Perth and Pilbara-Kimberley regions. Whereas the Melbourne region's contribution to growth equalled its share of national GDP, the Sydney region was significantly increasing its share. For most other regions the contribution to national GDP growth between 2014 and 2016 was less than their contribution between 2000 and 2012. This is particularly true for the Queensland regions.

Each industry sector has a flow-on impact (multiplier) to its region. The industry types with the highest flow-on impacts are high-tech industries and this means the greater the concentration of these industries, the higher the economic performance. High-tech industries are unlikely to locate to regions where the local employment catchment does not have a concentration of high skilled households.

Clusters of industry types are immensely important in developing a contemporary economic system because high value adding businesses require a greater intensification of knowledge. So co-location of industry types is likely to be more important than ever before. Industry clusters are likely to stimulate a greater capacity for the industry to develop higher levels of skills as employees move from one company to another and network in industry groups. These clusters provide education and training organisations the critical mass to deliver education and training for the industry.

So the greater the level of economic activity within any given region and its catchment, the greater the economic benefit to the people that live there. Increasing the scale of the metropolitan region including the expansion of positive attributes, which include high-tech industries and cluster types is shown to increase productivity. The perverse of these rules of economic development is that the greater the distance from the region's central cluster of activity, for example, in the case of the Melbourne or the Sydney CBD and inner municipalities, the greater the distance from these, the greater the increase in inequality.

As discussed in previous State of the Region's reports, infrastructure investment is therefore an essential part of assisting regions outside of the inner city clusters of economic activity to grow their economies and reduce the social impacts of economic inequality. To grow employment and real incomes, regions must grow their capital stock. Lost investment opportunities mean lost employment and productivity growth, and as a consequence lower per capita real income growth. Infrastructure investment is particularly important at the regional level because it is a catalyst, or driver, of private sector investment.

Rapid advances in technology, particularly digital technology, are changing industry and changing the types of skills needed by industry. These changes mean that education is more important than ever in shaping employment opportunities and digital literacy sits alongside the fundamental importance of literacy and numeracy skills. Rapid change means a life-long learning approach to employment and career development. Local government can help promote these ideas within their communities.
Of the 19 top level industry sectors, the sectors that employ the most people are Health care and social assistance, Retail trade, Construction, Professional, scientific and technical services and Education. Between them these five sectors account for 48.2 per cent of employment.

5.1 Industry gross value added: National trends

Figure 5.1 and 5.2 give the share of industry gross value added in 2007 and 2017. The largest differences (growth) in the share of industry value added over the decade are in Mining from 6.1 per cent in 2007 to 8.2 per cent in 2017, Health services from 6.9 per cent to 8.2 per cent, Financial services from 9.9 per cent to 10.6 per cent and Professional services from 6.9 per cent to 7.6 per cent. The largest shares of industry gross value added in 2017 are in Financial services at 10.6 per cent, Construction at 9.1 per cent, Mining and Health, both at 8.2 per cent. The largest decline in the share of industry gross value added was in Manufacturing which fell from 9.9 per cent in 2007 to 6.9 per cent in 2017.





5.2 Employment and industry sectors: National trends

Figure 5.3 and 5.4 compare industry sector share of total employment in Australia in 2007 and 2017. The largest positive changes in employment by sector in this period have occurred in the Health and related sectors where employment share has risen from 10.3 per cent to 12.6 per cent of total employment, making this the largest employment sector in 2017. The Education sector increased its share of total employment, from 7.2 per cent in 2007 to 8 per cent in 2017, and Professional services, from 7.2 per cent in 2017. Mining also increased its share of employment, but from a relatively low base, its share rising from 1.3 per cent in 2007 to 1.9 per cent in 2017.

Notable declines in share of total employment occurred in the Manufacturing sector, from 9.9 per cent to 7.5 per cent and in retail, from 11.4 per cent to 10.2 per cent. While decline in total share of employment can be as a result of the rapid growth of other sectors, special attention is given in this chapter to the Retail and Manufacturing sectors because these sectors demonstrate both risks and opportunities related to changes in structure and the influence of technology, with a particular regard to outcomes for what have traditionally been sectors providing large scale employment across regions. Employment in these two sectors is examined in greater detail in this chapter.

NIEIR's forecasts indicate that the industry sectors that are likely to grow employment fastest and provide around half of all new jobs over the next five years are:

- Health care and social assistance;
- Education and training;
- Construction; and
- Professional, scientific and technical services.





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5.3 Retail employment by SOR region

The retail sector is important, and important to regional Australia, in that it provides local employment as well as employment for young people, often as a first job, so the retail sector assists young people in learning job ready skills.

The Retail sector is composed of:

- a small number of large and often highly profitable retailers with large stores, large numbers of employees and strong ICT capacity including supply chain management and marketing; and
- many smaller shops, some of which are an attempt at refuge employment² and a proportion of these generate very low returns, ICT capacity is often poor as is the capacity for staff training.

Productivity gains and patterns of consolidation in the industry reflect the increasing efficiency of larger retailers. Technology will continue to be the driver of future productivity. The capacity of smaller retailers to develop online retailing is limited by skills and the financial capacity to build online sales, smaller shops with owners nearing retirement, are likely to lack enthusiasm for developing online sales. The question for local government is, how vulnerable to digital disruption are these shops going to become?

While at least some of Australia's major retailers were slow to react to the opportunities and threats from online retailing, this is changing. There has, however, been a significant penetration of online sales, clothing is just one example, into the Australian market from firms with little or no physical presence in Australia. The most successful online retail operations, and fast and effective distribution is essential, are large Australian retailers, international firms selling their products into Australia, international firms such as Amazon and Alibaba who plan an expanding local presence, and a cohort of locally developed businesses, including entrepreneurial start-ups, often without a previous track record in the bricks and mortar retail sector. The question for local government then becomes how vulnerable does this make the smaller retailers who lack the interest to engage in the web based economy?

Technology and the Internet continue to disrupt the way in which consumers purchase products. The evolution in the way hand held devices are used for shopping is an indicator of change. Hand held devices were likely to be used in conjunction with a physical store so goods could be viewed as part of the purchasing decision. While this still happens, this way of shopping is less likely to be the case around the world today, as a new generation of consumers purchase goods direct from the device. Hand held devices can also be used as checkout payment tools in new kinds of retail stores and this means no checkout staff and significant changes to the kinds of jobs in store and the knowledge and skills required for these.

China, a leader in the development of online retail with the extraordinary growth of companies such as Alibaba, is an indicator of future trends. While there are cultural differences across international markets, the issue here is price and that is where online retail is a threat to traditional retail in Australia. There is also a trend that once dominant, online retailers may jump back into bricks and mortar shops, but in high value locations. Some categories remain dominant in online sales but few categories are immune from web-based competition. So disruption to the traditional retail sector is coming from many different directions. The trend in the USA is that consumer traffic to the bricks and mortar store is declining year on year and the trend is a significant one.

Postal services, warehousing and distribution are the beneficiaries of these changes but technology means fewer warehouse staff. So these types of changes in the retail sector describe the way in which jobs are being lost to technology and productivity gains across the economy.

² Refuge employment refers to jobs that people 'buy', for example a café.

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While this does not apply to all retail sector companies, its workplace, and this has been an international feature of the industry, functions with a high proportion of low skilled workers and relatively little attention to industry training. The retail sector also employs a high proportion of part time and casual workers, many with relatively low levels of remuneration. Qualifications relating to the industry tend to be concentrated (particularly at degree level) at management or professional level.

Productivity improvements in the retail sector will come about through improving professional standards through professional development strategies, innovative management practices and higher skilled and more knowledgeable employees. ICT and STEM skills generally play an important role here.

Retail sector skills now include:

- online marketing, multichannel skills, online branding;
- big data and analytics;
- rapid change in demand and supply chain management;
- understanding m-commerce tablets and smartphones;
- design and web development;
- online branding and app development;
- online marketing, multichannel skills, online branding;
- lean distribution;
- direct marketing and customer preferences; and
- content management and social media.

Table 5.1 shows the SOR regions with the highest employment growth in the retail sector in the period 2001 to 2016. Population growth and higher levels of household disposable income are important drivers of growth in retail employment and to date these factors have held at bay the increasing competition and disruption from online sales. In the period 2001 to 2016 Melbourne Northern Outer and Melbourne Western had the highest levels of growth in retail employment reflecting rapid population growth in these regions of Melbourne.

Table 5.1 Highest growth – Retail employment growth 2001 to 2016													
					A	Average annual growth							
					2001	2006	2011	2001					
					to	to	to	to					
SOR name	2001	2006	2011	2016	2006	2011	2016	2016					
Melbourne Northern Outer	13217	13459	16409	22494	0.4	4.0	6.5	3.6					
Melbourne Western	27213	29591	33801	45140	1.7	2.7	6.0	3.4					
WA Peel South West	10528	12416	12921	15607	3.4	0.8	3.8	2.7					
Perth Outer North	22750	23807	26452	33146	0.9	2.1	4.6	2.5					
SEQ Gold Coast	24399	29875	30391	34007	4.1	0.3	2.3	2.2					
Melbourne City	15290	17881	18165	21241	3.2	0.3	3.2	2.2					
SEQ Sunshine Coast	14201	18056	18348	19722	4.9	0.3	1.5	2.2					
Perth Outer South	20073	21284	24465	27847	1.2	2.8	2.6	2.2					
SEQ Moreton Bay	13566	14846	17379	18752	1.8	3.2	1.5	2.2					
SEQ West Moreton	8314	9282	10644	11422	2.2	2.8	1.4	2.1					

Note: At time of publishing, the data for 2017 was unavailable.

Table 5.2 shows the SOR regions with the lowest levels of growth in retail employment. No growth or small declines in retail employment occurred in a range of SOR regions. The ACT result may show the impact of online retail in this well connected region with fast broadband, ICT knowhow and high levels of disposable income. It is possible that Canberra residents are spending their money elsewhere, in other parts of Australia or overseas. Retail leakage into other regions as consumers travel elsewhere to shop, as for example a major shopping centre expansion in an adjoining region, also account for low growth in employment. Low levels of disposable household income also narrow the opportunities for growth in local retail employment.

Table 5.2Lowest growth – Retail employment growth 2001 to 2016												
					A	verage an	nual grow	th				
					2001	2006	2011	2001				
SOR name	2001	2006	2011	2016	to 2006	to 2011	to 2016	to 2016				
ACT	19183	17260	16944	17254	-2.1	-0.4	0.4	-0.7				
Melbourne Eastern Inner	31674	30501	30505	30106	-0.8	0.0	-0.3	-0.3				
Sydney Outer Northern Shores	36684	33027	34023	34994	-2.1	0.6	0.6	-0.3				
Melbourne Eastern Outer	29512	27654	27664	28167	-1.3	0.0	0.4	-0.3				
NSW Central West	8310	8275	8254	8020	-0.1	-0.1	-0.6	-0.2				
NSW Orana	5778	5741	5679	5578	-0.1	-0.2	-0.4	-0.2				
TAS North	6898	7570	7493	6747	1.9	-0.2	-2.1	-0.1				
NSW Murrumbidgee	8081	8150	8034	7952	0.2	-0.3	-0.2	-0.1				
NSW Murray Far West	6382	6718	6578	6302	1.0	-0.4	-0.9	-0.1				
NSW Northern Inland	8272	8380	8553	8347	0.3	0.4	-0.5	0.1				

Note: At time of publishing, the data for 2017 was unavailable.

Table 5.3 provides changes to retail employment in the period 2001 to 2016 for all SOR regions. In 2016, and as one would expect, the highest number of jobs in the retail sector, were in SEQ Brisbane City because of its regional scale, Perth Central, Melbourne Western, Melbourne Southern Inner, Sydney Metropolitan Core, and Adelaide South. The regions with the lowest number of jobs in the Retail sector were in regional areas with relatively low populations and in regions with lower levels of household disposable. The point being, it is in the later regions where pressure on retail employment is likely to be significant in coming years.

In the period 2001 to 2016, the retail sector in Australia grew employment by 166,000 jobs. The trend has been to a higher proportion of part time jobs, part time share of total employment rising from 41.2 per cent in 2001 to 48.2 per cent in 2016.

Table 5.3Retail employment	t – Place of	work 2001	to 2016					
					Average annual growth			
					2001	2006	2011	2001
					to	to	to	to
SOR name	2001	2006	2011	2016	2006	2011	2016	2016
SEQ Brisbane City	58906	65564	65891	71998	2.2	0.1	1.8	1.3
Perth Central	44043	46151	45041	46778	0.9	-0.5	0.8	0.4
Melbourne Western	27213	29591	33801	45140	1.7	2.7	6.0	3.4
Melbourne Southern Inner	42807	43983	44286	43758	0.5	0.1	-0.2	0.1
Sydney Metropolitan Core	33357	37292	37440	42090	2.3	0.1	2.4	1.6
Adelaide South	35084	37704	37746	38690	1.5	0.0	0.5	0.7
Sydney Outer Northern Shores	36684	33027	34023	34994	-2.1	0.6	0.6	-0.3
SEQ Gold Coast	24399	29875	30391	34007	4.1	0.3	2.3	2.2
Perth Outer North	22750	23807	26452	33146	0.9	2.1	4.6	2.5
Melbourne Southern Outer	24881	25546	27892	32391	0.5	1.8	3.0	1.8
Adelaide North	26084	27851	29419	30651	1.3	1.1	0.8	1.1
Sydney Outer West	26609	26370	28024	30248	-0.2	1.2	1.5	0.9
Melbourne Eastern Inner	31674	30501	30505	30106	-0.8	0.0	-0.3	-0.3
Sydney Mid West	25634	25264	25227	29055	-0.3	0.0	2.9	0.8
Melbourne Eastern Outer	29512	27654	27664	28167	-1.3	0.0	0.4	-0.3
Perth Outer South	20073	21284	24465	27847	1.2	2.8	2.6	2.2
Melbourne Northern Inner	25556	25146	26660	27010	-0.3	1.2	0.3	0.4
Sydney Parramatta Ryde	20490	20769	20305	23069	0.3	-0.5	2.6	0.8
Melbourne Northern Outer	13217	13459	16409	22494	0.4	4.0	6.5	3.6
NSW Coastal Hunter	21940	21288	22307	22190	-0.6	0.9	-0.1	0.1
Melbourne City	15290	17881	18165	21241	3.2	0.3	3.2	2.2
SEQ Logan Redland	18846	20247	22105	21128	1.4	1.8	-0.9	0.8
Sydney Outer South West	18022	17893	17844	19935	-0.1	-0.1	2.2	0.7
Sydney Eastern Shores	18481	18857	17672	19825	0.4	-1.3	2.3	0.5
Sydney South East	17323	15819	15499	19822	-1.8	-0.4	5.0	0.9
SEQ Sunshine Coast	14201	18056	18348	19722	4.9	0.3	1.5	2.2
Sydney Near West	15906	16517	16837	19315	0.8	0.4	2.8	1.3
SEQ Moreton Bay	13566	14846	17379	18752	1.8	3.2	1.5	2.2
ACT	19183	17260	16944	17254	-2.1	-0.4	0.4	-0.7
NSW Central Coast	15629	16126	16566	17232	0.6	0.5	0.8	0.7
NSW North Coast	13168	15020	14907	16013	2.7	-0.2	1.4	1.3
VIC Loddon Mallee	15005	15918	16631	15961	1.2	0.9	-0.8	0.4
WA Peel South West	10528	12416	12921	15607	3.4	0.8	3.8	2.7
NSW Northern Rivers	13154	15186	15044	14506	2.9	-0.2	-0.7	0.7
NSW Illawarra	13367	13101	12588	14417	-0.4	-0.8	2.8	0.5
TAS Hobart South	12151	13396	13596	14389	2.0	0.3	1.1	1.1
QLD Darling Downs South West	12679	13391	13992	13836	1.1	0.9	-0.2	0.6
QLD Townsville North West	12374	12653	13292	13763	0.4	1.0	0.7	0.7
QLD Far North Torres	12397	14124	14246	13518	2.6	0.2	-1.0	0.6
VIC Hume	12333	12990	13081	13371	1.0	0.1	0.4	0.5
QLD Wide Bay Burnett	11355	12729	13411	12909	2.3	1.0	-0.8	0.9
VIC Geelong	11533	12592	13307	12578	1.8	1.1	-1.1	0.6
VIC Gippsland	11673	13028	12872	11877	2.2	-0.2	-1.6	0.1
QLD Fitzroy Central West	10306	10979	11267	11574	1.3	0.5	0.5	0.8
SEQ West Moreton	8314	9282	10644	11422	2.2	2.8	1.4	2.1

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Table 5.3Retail employment – Place of work 2001 to 2016 (continued)													
					A	verage an	nual growt	th					
					2001	2006	2011	2001					
					to	to	to	to					
SOR name	2001	2006	2011	2016	2006	2011	2016	2016					
VIC Grampians	10166	10231	10697	10882	0.1	0.9	0.3	0.5					
NSW Inland Hunter	7983	8724	8995	9923	1.8	0.6	2.0	1.5					
QLD Mackay	7346	8719	8889	9459	3.5	0.4	1.2	1.7					
NSW Northern Inland	8272	8380	8553	8347	0.3	0.4	-0.5	0.1					
NSW Southern Tablelands	7943	8176	8616	8294	0.6	1.1	-0.8	0.3					
NSW South Coast	7849	8832	8447	8263	2.4	-0.9	-0.4	0.3					
NSW Central West	8310	8275	8254	8020	-0.1	-0.1	-0.6	-0.2					
NSW Murrumbidgee	8081	8150	8034	7952	0.2	-0.3	-0.2	-0.1					
NT Darwin	6098	6011	6166	7162	-0.3	0.5	3.0	1.1					
VIC South West	6760	7269	7428	7081	1.5	0.4	-1.0	0.3					
SA East	6356	7035	6923	7078	2.1	-0.3	0.4	0.7					
TAS North	6898	7570	7493	6747	1.9	-0.2	-2.1	-0.1					
NSW Murray Far West	6382	6718	6578	6302	1.0	-0.4	-0.9	-0.1					
TAS North West	5224	5583	5803	5988	1.3	0.8	0.6	0.9					
SA North	5365	5783	5940	5929	1.5	0.5	0.0	0.7					
WA Gascoyne Goldfields	5451	5691	6001	5926	0.9	1.1	-0.3	0.6					
NSW Orana	5778	5741	5679	5578	-0.1	-0.2	-0.4	-0.2					
WA Wheatbelt Great Southern	5255	5752	5627	5318	1.8	-0.4	-1.1	0.1					
SA Fleurieu	4103	4531	4918	4737	2.0	1.7	-0.7	1.0					
SA Far North and West	3939	4073	3864	4177	0.7	-1.0	1.6	0.4					
WA Pilbara Kimberley	3099	3171	3391	3526	0.5	1.3	0.8	0.9					
NT Lingiari	3083	3062	3246	3154	-0.1	1.2	-0.6	0.2					
Australia	1077437	1129907	1162649	1243635	1.0	0.6	1.4	1.0					
Australia full-time	633828	636857	622327	643597	0.1	-0.5	0.7	0.1					
Australia part-time	443609	493050	540322	600038	2.1	1.8	2.1	2.0					
Part-time share %	41.2	43.6	46.5	48.2	1.1	1.3	0.7	1.1					

Note: At time of publishing, the data for 2017 was unavailable.

5.4 Manufacturing employment by SOR region

The trend for the manufacturing sector in Australia is towards advanced manufacturing, which is a knowledge intensive industry, and this includes relatively low run bespoke manufacturing. The impact of the loss of the automotive manufacturing industry is not fully played-out as manufacturing closures and restructuring are likely to continue for some time, including further impacts in Melbourne. A long-term consequence from the loss of the automotive manufacturing industry will be the loss of access to these global manufacturing skills and the knowledge diffusion to other industries that has been such a strong feature of automotive manufacturing and a contribution to economic development. The consequential hollowing out of supply chains is likely to create a problem for existing industry and be a barrier to new manufacturing opportunities.

That said, caravan manufacturing, food process manufacturing and manufacturing using new technologies such as 3D printing continue to provide opportunities. Construction and manufacturing are linked and further opportunities in factory assembled building modules, prefabrication, should be a contemporary feature of the construction industry. The link between manufacturing and construction are clearly expressed in the growth of bespoke manufacturing employment in mining regions.

Advanced manufacturing means research and development, use of advanced materials, advanced processes and high levels of design within a complex global supply chains. The complexity of advanced manufacturing operations requires highly skilled workers and close relationships between providers of education and training and companies in the sector.

In the advanced manufacturing industry the impact of digital technologies is significant. The structure of the industry is also changing with the blending of occupations and changes to the relationships with customers and supply chain companies. These changes include the blending of traditional processes of design, engineering, planning, manufacturing with for example, marketing and distribution and ownership intellectual property rights. Research and development and intellectual property rights are an important foundation of this industry.

NIEIR research in Melbourne's manufacturing regions indicate that opportunities in advanced manufacturing exists for:

- customised or bespoke product manufacturing for local markets with a low level of competition from international suppliers because of scale; and
- high value products where the IP rights reside with the manufacturer (although some of these manufactures may be offshored, revenues flow back to Australia because the Australian firm owns the intellectual property rights).

To be successful, the development of an advanced manufacturing industry requires strong links with universities and this research and development expertise. Innovation, collaboration and industry clusters are very important in the development of this industry.

Events in the USA and UK have shown that it is possible, with the appropriate investments, to rebuild the manufacturing sector. Although this progress is likely now to be distorted by political events, in the USA, 'America First' promoting investment in local employment, and in the case of the UK, Brexit, placing a very big question mark over the competitiveness of UK's manufacturing sector. So government policies and thinking can have a significant influence on manufacturing employment and future opportunities for developing a future industry.

While Australia may lament lost opportunities and foregone investments in the renewable energy sector manufacturing opportunities, with the right kind of approach, these opportunities may still exist in construction related energy saving technologies and renewables equipment manufactures. A recent NIEIR future employment study found that Germany employs nearly 400,000 people in its renewables sector, of which almost 250,000 are involved in new energy technology manufactures. At least 40 per cent of this workforce is working on exporting new energy technologies and manufactures around the world. Germany is a leader in solar and wind technologies and is also a leader in combined heat and power (CHP) technologies. Manufactures include solar inverters, solar panels, biomass units, rotor blades, turbines and production equipment used in manufacturing for the industry.

Given that total Chinese public and private investment in energy efficiency improvements (EEI) was US\$249 billion over the period 2010 to 2014 which resulted in 47 per cent of the reduction in energy intensity (see Energy chapter in this report) and given that China is likely to spend a further US\$270 billion by 2020 on EEI improvements this offers opportunities for Australian industry and expertise to assist China in what is a globally important and necessary task. These polices are embedded in China's 13th Five Year Plan. Here the opportunities for employment growth in Australia lie in a blending of research, professional services and manufacturing.

Table 5.4 shows the SOR regions with the highest employment growth in the Manufacturing sector in the period 2001 to 2016. The picture here shows one of employment growth in mining and construction related manufacturing associated with the mining construction investments in the period. Mining construction related manufacturing rises and falls in line with development activity.

Table 5.4 Highest growth – Manufacturing employment growth 2001 to 2016												
					A	verage an	nual grow	th				
					2001	2006	2011	2001				
SOR name	2001	2006	2011	2016	2006	2011	2016	2016				
NT Darwin	344	444	226	627	5.3	-12.6	22.6	4.1				
WA Pilbara Kimberley	1769	1853	2400	3035	0.9	5.3	4.8	3.7				
NT Lingiari	3805	4307	4649	5885	2.5	1.5	4.8	3.0				
WA Peel South West	9685	13069	13428	14815	6.2	0.5	2.0	2.9				
QLD Mackay	5338	6795	7441	7671	4.9	1.8	0.6	2.4				
WA Gascoyne Goldfields	3098	3974	4232	4251	5.1	1.3	0.1	2.1				
QLD Fitzroy Central West	8835	11378	11354	11809	5.2	0.0	0.8	2.0				
Perth Outer South	18849	23204	22327	24114	4.2	-0.8	1.6	1.7				
NSW Coastal Hunter	18484	20796	21260	22577	2.4	0.4	1.2	1.3				
Perth Outer North	18073	21715	21316	21842	3.7	-0.4	0.5	1.3				

Note: At time of publishing, the data for 2017 was unavailable.

Table 5.5: The important numbers in this table are from the traditional manufacturing regions where the sector has developed over a long period, these regions are highly skilled in manufacturing and their declines in employment describe the trend in offshoring of basic manufactures, gentrification and changing land use patterns in inner city regions as is the case for Melbourne Northern Inner, higher levels of automation and signs of the loss of automotive manufacturing. Regional declines in manufacturing employment are also and indicator of reductions in non-dwelling construction activities and the related slowing of investment in major resource developments.

Table 5.5 Lowest growth – Manufacturing employment growth 2001 to 2016													
					A	verage an	nual grow	th					
					2001	2006	2011	2001					
					to	to	to	to					
SOR name	2001	2006	2011	2016	2006	2011	2016	2016					
Melbourne Northern Inner	29904	26885	21742	19055	-2.1	-4.2	-2.6	-3.0					
ACT	5555	5438	4499	3586	-0.4	-3.7	-4.4	-2.9					
Sydney South East	11582	10308	8441	7777	-2.3	-3.9	-1.6	-2.6					
Adelaide South	27927	28294	22767	18960	0.3	-4.3	-3.6	-2.5					
Melbourne Eastern Inner	29833	30301	24136	20805	0.3	-4.4	-2.9	-2.4					
NSW Illawarra	13685	13914	11156	9637	0.3	-4.3	-2.9	-2.3					
Sydney Near West	14777	14079	11603	10917	-1.0	-3.8	-1.2	-2.0					
Sydney Mid West	62183	59696	49178	46009	-0.8	-3.8	-1.3	-2.0					
TAS Hobart South	9229	10042	8756	7277	1.7	-2.7	-3.6	-1.6					
Adelaide North	45574	49042	42606	36498	1.5	-2.8	-3.0	-1.5					

Note: At time of publishing, the data for 2017 was unavailable.

From an industry roundtable for a recent future workplace study for Melbourne's Northern Region, manufacturing industry delegates cited their concerns regarding the current situation faced by manufacturing companies in the region. These concerns included the hollowing out of local supply chains and the relocation of various kinds of manufacturing to Asia. In relation to these factors concern was expressed regarding the loss of critical mass in parts of the manufacturing sector and the impact of this loss on the capacity to train specialist staff and to find suitably trained employees as technologies change. STEM skills, or the lack of them, were seen as another important issue. Retaining suitable staff and the sector's capacity to attract young people into the manufacturing sector were also a major concern.

Delegates to the roundtable were also keen to establish a regional industry group to encourage better links between sector firms as well as with TAFEs and Universities. The delegates also identified opportunities from higher levels of research and development activities, new product development and better marketing of the manufacturing sector and its products. The delegates thought that the sector would be better positioned if secondary schools encouraged more students to study mathematics and science and that students were encouraged to learn about manufacturing and employment opportunities within the sector.

A role for local government is to assist the manufacturing sector within its catchment to improve local linkages between firms, to encourage opportunities for collaboration, and to encourage links between firms and secondary schools and higher education.

Table 5.6 gives SOR regions listed in order by number of jobs in 2016. The sector shed some 43,000 jobs in the period from 2001 to 2016 with a trend to a higher level of part time employment. Employment in the sector was boosted by the mining investment boom, so with its decline and the loss of automotive manufacturing numbers employed in the sector are likely to keep declining.

Table 5.6 Manufacturing employment – Place of work 2001 to 2016									
					Average annual growth				
					2001	2006	2011	2001	
					to	to	to	to	
SOR name	2001	2006	2011	2016	2006	2011	2016	2016	
SEQ Brisbane City	60213	76605	70362	65951	4.9	-1.7	-1.3	0.6	
Melbourne Southern Inner	64768	68935	61608	58157	1.3	-2.2	-1.1	-0.7	
Sydney Mid West	62183	59696	49178	46009	-0.8	-3.8	-1.3	-2.0	
Melbourne Western	40707	41566	40038	43489	0.4	-0.7	1.7	0.4	
Adelaide North	45574	49042	42606	36498	1.5	-2.8	-3.0	-1.5	
Perth Central	32934	38748	33761	32313	3.3	-2.7	-0.9	-0.1	
Sydney Outer West	28358	29251	27740	31211	0.6	-1.1	2.4	0.6	
Melbourne Northern Outer	33153	33421	30838	30400	0.2	-1.6	-0.3	-0.6	
Melbourne Eastern Outer	32910	33745	30387	27106	0.5	-2.1	-2.3	-1.3	
Sydney Parramatta Ryde	27878	28577	27255	26570	0.5	-0.9	-0.5	-0.3	
Perth Outer South	18849	23204	22327	24114	4.2	-0.8	1.6	1.7	
NSW Coastal Hunter	18484	20796	21260	22577	2.4	0.4	1.2	1.3	
Sydney Outer South West	21714	21721	21318	22142	0.0	-0.4	0.8	0.1	
Perth Outer North	18073	21715	21316	21842	3.7	-0.4	0.5	1.3	
Melbourne Eastern Inner	29833	30301	24136	20805	0.3	-4.4	-2.9	-2.4	
Melbourne Northern Inner	29904	26885	21742	19055	-2.1	-4.2	-2.6	-3.0	
Adelaide South	27927	28294	22767	18960	0.3	-4.3	-3.6	-2.5	
SEQ Gold Coast	16926	23523	19801	18481	6.8	-3.4	-1.4	0.6	
Sydney Metropolitan Core	21813	22691	19696	18409	0.8	-2.8	-1.3	-1.1	
Sydney Outer Northern Shores	19189	18667	17217	16528	-0.5	-1.6	-0.8	-1.0	
Melbourne Southern Outer	14946	16421	15617	16413	1.9	-1.0	1.0	0.6	
Melbourne City	13466	15885	16134	15799	3.4	0.3	-0.4	1.1	
WA Peel South West	9685	13069	13428	14815	6.2	0.5	2.0	2.9	
VIC Hume	14472	15611	14294	13978	1.5	-1.7	-0.4	-0.2	
SEQ West Moreton	11112	13907	13171	13139	4.6	-1.1	0.0	1.1	
VIC Loddon Mallee	12933	14514	13338	13003	2.3	-1.7	-0.5	0.0	
Sydney Eastern Shores	13027	12555	10678	12454	-0.7	-3.2	3.1	-0.3	
SEQ Logan Redland	11916	14005	13776	12267	3.3	-0.3	-2.3	0.2	
QLD Fitzroy Central West	8835	11378	11354	11809	5.2	0.0	0.8	2.0	
Sydney Near West	14777	14079	11603	10917	-1.0	-3.8	-1.2	-2.0	
QLD Darling Downs South West	10149	12351	10908	9907	4.0	-2.5	-1.9	-0.2	
SEQ Moreton Bay	8785	10546	10280	9775	3.7	-0.5	-1.0	0.7	
NSW Illawarra	13685	13914	11156	9637	0.3	-4.3	-2.9	-2.3	
VIC Geelong	11876	13242	11405	9543	2.2	-2.9	-3.5	-1.4	
NSW Central Coast	9799	10568	9698	9526	1.5	-1.7	-0.4	-0.2	
QLD Townsville North West	8773	10651	10526	9431	4.0	-0.2	-2.2	0.5	
VIC Grampians	8787	9439	8746	8896	1.4	-1.5	0.3	0.1	
QLD Wide Bay Burnett	8438	10336	9800	8488	4.1	-1.1	-2.8	0.0	
VIC Gippsland	8023	9226	8801	8086	2.8	-0.9	-1.7	0.1	
NSW Murrumbidgee	6898	8261	8064	8059	3.7	-0.5	0.0	1.0	
SEQ Sunshine Coast	7014	9117	8352	7864	5.4	-1.7	-1.2	0.8	
Sydney South East	11582	10308	8441	7777	-2.3	-3.9	-1.6	-2.6	
QLD Mackay	5338	6795	7441	7671	4.9	1.8	0.6	2.4	
NSW Central West	7565	7776	7217	7492	0.6	-1.5	0.8	-0.1	
NSW Northern Rivers	6840	8188	7925	7326	3.7	-0.6	-1.6	0.5	

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Table 5.6 Manufacturing employment – Place of work 2001 to 2016 (continued)													
					A	verage an	nual growt	th					
					2001	2006	2011	2001					
					to	to	to	to					
SOR name	2001	2006	2011	2016	2006	2011	2016	2016					
NSW North Coast	6709	7741	6901	7303	2.9	-2.3	1.1	0.6					
TAS Hobart South	9229	10042	8756	7277	1.7	-2.7	-3.6	-1.6					
SA East	8228	9220	7771	7142	2.3	-3.4	-1.7	-0.9					
TAS North West	6682	7480	7072	7022	2.3	-1.1	-0.1	0.3					
SA North	6156	7656	7374	6997	4.5	-0.7	-1.0	0.9					
NSW Inland Hunter	5970	6858	6825	6786	2.8	-0.1	-0.1	0.9					
VIC South West	6045	6639	6546	6311	1.9	-0.3	-0.7	0.3					
QLD Far North Torres	6992	8213	7024	6090	3.3	-3.1	-2.8	-0.9					
NT Lingiari	3805	4307	4649	5885	2.5	1.5	4.8	3.0					
TAS North	6323	7097	6167	5625	2.3	-2.8	-1.8	-0.8					
NSW Southern Tablelands	5587	6073	5752	5444	1.7	-1.1	-1.1	-0.2					
NSW Northern Inland	4633	5438	5467	5345	3.3	0.1	-0.4	1.0					
NSW Murray Far West	4915	5742	5467	4988	3.2	-1.0	-1.8	0.1					
NSW South Coast	4231	4864	4784	4471	2.8	-0.3	-1.3	0.4					
WA Gascoyne Goldfields	3098	3974	4232	4251	5.1	1.3	0.1	2.1					
ACT	5555	5438	4499	3586	-0.4	-3.7	-4.4	-2.9					
WA Wheatbelt Great Southern	3009	3735	3623	3527	4.4	-0.6	-0.5	1.1					
SA Far North and West	3304	3682	3797	3464	2.2	0.6	-1.8	0.3					
NSW Orana	3207	3271	2851	3047	0.4	-2.7	1.3	-0.3					
WA Pilbara Kimberley	1769	1853	2400	3035	0.9	5.3	4.8	3.7					
SA Fleurieu	2939	3375	2953	2960	2.8	-2.6	0.0	0.0					
NT Darwin	344	444	226	627	5.3	-12.6	22.6	4.1					
Australia	1018841	1112667	1012639	975868	1.8	-1.9	-0.7	-0.3					
Australia full-time	892075	967342	879245	836709	1.6	-1.9	-1	-0.4					
Australia part-time	126766	145325	133393	139159	2.8	-1.7	0.8	0.6					
Part-time share %	12.4	13.1	13.2	14.2	1.1	0.2	1.5	0.9					

Note: At time of publishing, the data for 2017 was unavailable.

5.5 Apprenticeships or traineeships

ABS data shows that the total number of apprentices and trainees has declined from 226,500 in 2011 to 187,500 in 2016. While the decline occurred across all age groups over the period from 2001, apprentices in the 20 to 24 year age group increased in the period from May 2015. As of May 2016, 5.4 per cent of persons aged 20 to 24 years were apprentices or trainees, 42.8 per cent of all apprentices and trainees were in the 20 to 24 year old age group.

The main field of trade in 2016 was construction, which had 46,000 apprentices or trainees, followed by electro-technology and telecommunications, which had 36,500 apprentices or trainees. Those who successfully complete their apprenticeships will obtain a nationally recognised qualification.

The number of apprentices and trainees is influenced by economic circumstances, as employers are reluctant to take on apprentices during periods of economic uncertainty, post GFC for example. Apprenticeships and traineeships are important because, in sectors such as construction, the workforce is ageing and trade skills are lost as experienced workers in the sector retire. As more students decide to go to university instead of taking on a traditional apprenticeship talent is lost when at least some individuals might be better directed into a career in the trades.

Australian apprenticeships provide the opportunity to train, study and work, thus receive an income while developing skills and industry knowledge. Apprenticeships cover more than 500 occupations ranging from apprenticeships in trade occupations such as plumbing to emerging careers across most industry sectors. Apprenticeships are available to anyone of working age, 60 per cent are aged 15 to 24 years and 70 per cent are male. Industry sectors with a high proportion of female apprentices or trainees are Health care and social assistance, at 88 per cent in 2014, and Financial services, at 65 per cent in 2014.

Applicants do not need a secondary school certificate or other qualification to be able to do an Australian apprenticeship.

Industry sectors offering apprenticeships include:

- Agriculture, horticulture and related industries;
- Automotive;
- Building and construction;
- Business services;
- Finance services;
- Food;
- Hairdressing;
- Community services and health;
- Information technology;
- Light manufacturing;
- Local government;
- Metals and engineering;
- Printing;
- Process manufacturing;
- Property services;
- Public services;
- Retail;
- Sport and recreation;
- Telecommunications;
- Tourism;
- Transport and distribution; and
- Utilities and energy.

The high dropout rate of apprentices and trainees is thought to be as a result of one or a combination of:

- little knowledge about the industry apprentices are about to enter and they decide the industry is not for them;
- low wages compared to other opportunities so they leave to seek employment outside of the apprentice system;
- difficulty in getting to work and study, poor access to public transport and probability of not having a car;
- ill prepared for employment, issues with job readiness, particularly standards of numeracy and literacy;
- status of apprentices and trainees does not reflect their importance. In other countries, Germany does this well, apprentices and trainees are more closely integrated into workforce development and planning; and
- in larger corporations in Australia a glass ceiling between employees with trade skills and the 'professional' workforce is now more common than was once the case. This means that career paths for much of the workforce are less clearly defined and opportunities for promotion are narrower.

The issue of a high dropout rate has proved difficult to resolve, with dropout rates still hovering in the high 40 per cent range for some industry sectors with trade apprenticeships among the higher rates on non-completion. In New South Wales data shows that 80 per cent of apprentices work in businesses with less than 50 employees. The costs of non-completion fall heavily on small and medium enterprises and across regions. Dropping out of apprenticeships has the potential to impact young people in a long-term and negative way. If apprentices complete their training data shows that future employment prospects are positive.

Department of Employment research suggests that employers who find it difficult to recruit apprentices and trainees do so because of poor attitudes and work ethic, little interest in being an apprentice and little commitment to a trade. While there are opportunities for employment many applicants do not match employer expectations. These attributes further describe the difficulties associated with retaining apprentices.

So what is the future for apprenticeships? Given that construction trades play a significant role in the apprenticeship system we make reference to the Master Builders Australia report *Towards 2020* which sets out benchmarks for future training and the apprenticeship system. Master Builders Australia state that "the construction industry is in a situation of record workforce participation but experiencing a decline in accredited training outcomes". The report goes on to say that "Australia's future productivity and competitiveness depend on a highly skilled and trained workforce. The National Training System performs an undeniable public good in providing a supply of necessary and valued skills for the nation and a pathway for satisfying careers for many Australians".

Policies for reform to the training system include improved literacy and numeracy and job readiness of apprentices and the development of policy settings that allow multiple pathways into building and construction jobs.

Given the challenge for the construction industry is to meet the rising demand for a skilled workforce, particularly given that the workforce is ageing and the introduction of many new technologies, the apprenticeship system of training remains crucial to meeting the demand for skilled labour. The challenge will be to reverse the trend of the decline in the number of apprentice commencements of around 19 per cent since 2010. Master Builders Australia's benchmark for apprentices in training in the sector is 100,000, an increase of 132 per cent on the number in 2015.

5.6 Skills and jobs in the digital economy

No industry sector or business will escape the transition to the digital economy and increasing reliance on web-based communications and the use of data in shaping business transactions and markets. Among the most important future skills will be a set of skills that enable the development and ongoing function of the digital economy. It is important to remember that the rapid technology diffusion that accompanies fast pace digital change means that it is necessary to adopt the idea that the new economy requires individuals to keep their skillsets in line with the rapid change and opportunities that new technologies deliver.

"Historically countries have adopted a new technology on average 45 years after its invention although the lag has shortened over time ... By contrast the internet has spread across the globe in 7 years The extent to which new technologies have been adopted still varies substantially across countries and can account for some 25 per cent of the differences in nations' per capita income today. However as lags become shorter, the rich world's advantage of being an early adopter will inevitable decrease."

The Oxford Martin Programme of Technology and Employment

The digital economy will continue to create enormous wealth around the world for those individual and companies that get it right. The Internet of things will create new opportunities to develop intelligent systems in a vast range of areas from medicine, energy and intelligent roads. It would be an excellent outcome if Australia's workforce could develop the skills and attract the venture capital to turn Australia from a consumer of digital services and products to a nation that becomes a driver of the digital economy, entrepreneurship and technical knowhow.

In this world industry and skills clusters are important drivers of economic development and advances in technology. Clusters of activity are defined in part by travel times and these can vary by industry sector. Office based and arts-related activity clusters can be defined in terms of walking distance, manufacturing clusters of activity within 20 minutes driving distance and agricultural clusters within 30 minutes driving distance. At country speeds this can mean a reasonable distance, which could be 50 kilometres or more. Clusters are defined by how easy it is for people to share knowledge and this makes the presence of university campuses in a region very important.

5.7 Disruption

Big data requires data computing technology, engineering, analyst and marketing skills. Cloud services enable the outsourcing of business services. Apart from the usual back office functions, operating systems and software and IT solutions are among the services being offered. Convergence and mobile computing is changing the way people work and shop, and ways in which they spend their leisure time and communicate with friends.

All these new ways of doing things require high broadband capability, which means bandwidth capacity and fast speeds.

Cyber security

Given the dominance and ever increasing reliance of web-based systems in just about every part of our lives we can image, we all understand the absolute importance of cyber security. Not to get this right will undermine economies, democracies and security. So the highest standards of cyber security are vitally important to us all. Cyber security also represents a burgeoning industry as described in the report entitled *Cyber Security Market by Solution – Global Forecast to 2020* by consulting firm Markets and Markets which estimates the cyber security market to be worth US\$170.21 billion by 2020 (suggesting the cyber security industry has a compound annual growth rate of 9.8 per cent).

To begin to understand the kinds of skills required to meet the challenges of this industry, the report looks at cyber security types.

"The cyber security types include network security, endpoint security, application security, content security, and wireless security and cloud security. The services are segmented as consulting, design and integration, risk and threat assessment, managed security services, and training and education. The market is segmented into solutions such as identity and access management, risk and compliance management, encryption, data loss prevention, unified threat management, firewall, antivirus and antimalware, Intrusion Detection System (IDS)/Intrusion Prevention System (IPS), Security Information and Event Management (SIEM), disaster recovery, Distributed Denial of Service (DDoS) mitigation, and whitelisting. The report classifies the industry sectors as aerospace, defence, and intelligence; government; banking, financial services, and insurance (BFSI); telecommunication; healthcare; retail; manufacturing; and others."

FinTech

FinTech is a revolution, driven by Silicon Valley venture capital, in the financial services industry. The FinTech industry is disrupting payment systems and wealth management, and enabling crowd funding and peer-to-peer lending. It is a start-up industry (and maturing) with potential revenues of \$4.7 trillion (Goldman Sachs).

MOOCs

Digital technologies are not only changing the workplace; the delivery of education is also changing rapidly. The higher education MOOCs (Massive Open Online Courses) have opened up access to tertiary education in terms of cost, distance and age.

Work

The world is uncertain about what will happen to jobs as a result of technology, automation and robotics. While future employment outcomes are hard to predict what is evident and ongoing is the restructuring of the workforce that employers use to adjust to changing circumstances. The media and publishing industries are among the recent examples of substantive workforce restructuring resulting in fewer jobs. NIEIR's research suggests that businesses will continue to employ a core team with corporate knowledge that comes from experience in an industry and within a business. The core team will increasingly require a skilled pool of labour working in the *Professional services* sector on activities that include web design and social media, law and financial services and so on, creating a

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complex and growing network of global outsourcing. Even so, businesses will require experts in each field to manage outsourcing activities and wise firms will include an ICT expert and other specialist staff on their boards. The next question is what will happen to the Professional services sector in terms of automation of services, including legal and accounting, and offshoring of services including back office processes. Part of the defence will be to maintain leading edge and regionally must have competencies that align with regional priorities, providing high level services to China in relation to sustainable energy policy and technology might be one of those capabilities.

5.8 NIEIR unemployment

As in previous *State of the Regions* reports the NIEIR unemployment rate is used in this chapter. The NIEIR Unemployment rate is calculated by adjusting the headline unemployment rate for excess take-up of disability support pension. As noted in previous *State of the Regions* reports, increases in the headline unemployment rate tend to be followed by transfer of many long-term unemployed to the disability pension. This transfer does not affect the social security take-up rate since the unemployed people who are transferred are generally already in receipt of Newstart allowances. However, in regions where NIEIR unemployment is significantly higher than the headline rate we generally find a disproportionately high rate of Social Security take-up. Though the NIEIR unemployment rate adjusts for the shift of unemployed people onto disability pensions, the Social Security take-up rate for persons of workforce age reflects additional aspects of community crisis, such as sole parents.

Table 5.7 NIEIR unemployment rate: Highest unemployment rate regions											
						Cha	nge		Rank out of 67		
					2002-	2007-	2012-	2002-		2012-	
SOR name	2002	2007	2012	2017	2007	2012	2017	2017	2017	2017	
QLD Wide Bay Burnett	17.8	12.7	15.5	16.7	-5.1	2.8	1.2	-1.1	1	20	
QLD Far North Torres	7.7	7.0	11.4	14.2	-0.7	4.4	2.8	6.5	2	3	
NSW South Coast	14.1	11.5	12.7	14.1	-2.5	1.1	1.5	0.1	3	15	
VIC Gippsland	11.8	10.0	11.2	13.5	-1.8	1.2	2.3	1.7	4	7	
QLD Townsville North West	10.5	7.6	8.3	12.7	-2.8	0.6	4.4	2.3	5	2	
NSW Northern Inland	10.6	10.0	12.1	12.5	-0.5	2.1	0.4	2.0	6	31	
NSW Northern Rivers	16.1	13.1	13.0	12.2	-3.0	0.0	-0.9	-3.9	7	60	
TAS North West	16.5	14.0	13.3	12.1	-2.6	-0.7	-1.2	-4.4	8	62	
WA Wheatbelt Great Southern	6.5	5.2	7.1	12.0	-1.3	1.9	4.9	5.5	9	1	
TAS North	13.7	9.9	10.8	11.9	-3.9	1.0	1.1	-1.8	10	22	
Average unemployment rate	12.4	10.0	11.6	13.4	-2.4	1.6	1.8	-15.8			
Australia	9.1	6.9	7.6	8.1	-2.2	0.7	0.5	-1.1			

Table 5.7 gives the regions with the highest NIEIR unemployment rates in 2017. QLD Wide Bay Burnett remains as the region with the nation's highest NIEIR unemployment rate, at 16.7 per cent, slightly down from 17.1 per cent in 2016, followed by Qld Far North Torres at 14.2 per cent, again slightly lower than last year's result of 14.8 per cent and NSW South Coast at 14.1 per cent. These regions continue to be beset by chronic problems such as low skilled, non-job ready and unqualified residents and lack of employment opportunities, or one or more of these in combination, resulting in a significant shift from unemployment benefits to disability pensions.

Table 5.8 gives the regions with the lowest NIER unemployment rates. In 2017 Melbourne City has the lowest NIEIR Unemployment rate in at 3.7 per cent. In 2016 Sydney Northern Beaches had the lowest NIEIR Unemployment rate at 3 per cent. Sydney Outer Northern Shores and Sydney.

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Table 5.8 NIEIR unemployment rate: Lowest unemployment rate regions												
						Cha	nge		Rank out of 67			
COD nome	2002	2007	2012	2017	2002-	2007-	2012-	2002-	2017	2012-		
SOR name	2002	2007	2012	2017	2007	2012	2017	2017	2017	2017		
Melbourne City	6.0	4.1	3.7	3.7	-1.8	-0.4	-0.1	-2.3	67	43		
Sydney Outer Northern Shores	3.9	3.4	4.0	3.8	-0.5	0.5	-0.1	-0.1	66	46		
Sydney Metropolitan Core	4.0	3.2	3.5	3.8	-0.8	0.4	0.3	-0.2	65	34		
NT Darwin	8.2	5.7	4.9	4.1	-2.4	-0.9	-0.8	-4.1	64	58		
Sydney Eastern Shores	5.2	3.8	4.7	4.5	-1.4	0.9	-0.1	-0.7	63	45		
Sydney South East	3.7	3.4	4.7	4.6	-0.3	1.3	-0.1	0.9	62	44		
Melbourne Eastern Inner	5.4	4.9	4.7	5.2	-0.5	-0.1	0.5	-0.2	61	29		
Sydney Near West	5.7	4.2	5.0	5.4	-1.5	0.9	0.4	-0.2	60	33		
ACT	6.5	4.2	5.2	5.7	-2.3	1.0	0.5	-0.8	59	28		
Perth Central	8.6	4.1	4.0	5.8	-4.6	0.0	1.8	-2.8	58	11		
Average unemployment rate	5.5	4.0	4.4	4.8	-1.6	0.4	0.4	-6.4				
Australia	9.1	6.9	7.6	8.1	-2.2	0.7	0.5	-1.1				

Metropolitan Core follow Melbourne City's lead in 2017 at 3.7 per cent with an unemployment rate of 3.8 per cent. NT Darwin follows at 4.1 per cent, but employment prospects are tightening in this part of the Northern Territory. The unemployment rate remains low among the affluent regions of Sydney and Melbourne and in Perth and the ACT. The top ten low unemployment regions continue all to be metropolitan.

Table 5.9NIEIR unemployment rate: Regions of fastest rise in unemployment rates 2012 to 2017												
						Cha	nge		Rank out of 67			
					2002-	2007-	2012-	2002-		2012-		
SOR name	2002	2007	2012	2017	2007	2012	2017	2017	2017	2017		
WA Wheatbelt Great Southern	6.5	5.2	7.1	12.0	-1.3	1.9	4.9	5.5	9	1		
QLD Townsville North West	10.5	7.6	8.3	12.7	-2.8	0.6	4.4	2.3	5	2		
QLD Far North Torres	7.7	7.0	11.4	14.2	-0.7	4.4	2.8	6.5	2	3		
QLD Mackay	7.8	3.7	4.4	7.2	-4.2	0.8	2.7	-0.7	47	4		
NSW Inland Hunter	13.6	11.1	7.6	10.0	-2.5	-3.5	2.4	-3.6	20	5		
Perth Outer North	7.3	5.0	5.1	7.5	-2.4	0.1	2.4	0.2	42	6		
VIC Gippsland	11.8	10.0	11.2	13.5	-1.8	1.2	2.3	1.7	4	7		
QLD Fitzroy Central West	9.9	6.2	7.4	9.6	-3.7	1.2	2.1	-0.3	26	8		
Perth Outer South	9.0	4.4	5.2	7.3	-4.5	0.8	2.1	-1.6	44	9		
WA Gascoyne Goldfields	8.3	6.1	5.3	7.2	-2.2	-0.8	1.9	-1.1	46	10		
Average unemployment rate	9.1	6.3	7.0	9.5	-2.8	0.7	2.6	-12.3				
Australia	9.1	6.9	7.6	8.1	-2.2	0.7	0.5	-1.1				

Table 5.9 shows the regions with the fastest rise in unemployment. The greatest rise in unemployment over the last five years has occurred in WA Wheatbelt Great Southern with a NIEIR unemployment rate of 12 per cent in 2017, followed by QLD Townsville North West, QLD Far North Torres, QLD Mackay and NSW Inland Hunter. The impact of farm consolidation and higher levels of automation in the agricultural sector is telling the story of productivity gains and declining or slow growth rates in employment in regions where agriculture predominates.

As in previous SOR reports, the disparities between regions remain and remedies to growing levels of inequality continue to be elusive. The urban regions where knowledge employment is a feature of industry composition, this combined with high skilled households, high levels of educational opportunity, high social status and inherited wealth, continue to have the lowest levels of NIEIR

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unemployment. Retirement/lifestyle regions, despite their attractive seascapes, maintain their established status as zones of limited economic opportunity while the fall-out from continued decline of employment in the manufacturing sector is increasingly impacting on manufacturing regions. Jobs in the manufacturing sector in firms that service mining investment related manufacturing are vulnerable when mine infrastructure is completed. As technology innovation reduces the demand for labour in the agricultural sector, populations and regional employment opportunities are consolidating in larger regional towns. As house prices in Melbourne and Sydney rise to unaffordable levels for many, these increases place greater stress on transport systems as workers have no choice but to commute longer distances from outer regions to CBD employment.

5.9 Youth unemployment: Highest and lowest unemployment regions

By January 2016 more than 50 per cent of 15 to 24 year olds were engaged in full-time education. Meanwhile, 11 per cent of this cohort were neither participating in full-time education or employment. The disengaged young remain a major concern, as does inequality of employment outcomes between regions.

Table 5.10Youth unemployment rate (aged 15 to 24 years): Highest unemployment rate regions											
					Change				Rank o	ut of 67	
SOR name	2002	2007	2012	2017	2002- 2007	2007- 2012	2012- 2017	2002- 2017	2017	2012- 2017	
NSW South Coast	15.8	16.9	15.9	25.1	1.1	-0.9	9.2	9.4	1	2	
QLD Townsville North West	11.8	9.2	15.4	23.5	-2.6	6.2	8.1	11.6	2	3	
QLD Wide Bay Burnett	19.4	10.9	15.1	23.0	-8.5	4.2	7.9	3.6	3	5	
WA Wheatbelt Great Southern	8.4	5.2	6.0	22.1	-3.1	0.8	16.1	13.7	4	1	
QLD Far North Torres	12.9	6.9	12.2	20.2	-6.0	5.2	8.0	7.3	5	4	
Melbourne Northern Outer	14.7	11.5	12.5	19.5	-3.1	0.9	7.0	4.8	6	6	
Adelaide North	15.0	13.2	11.9	18.8	-1.8	-1.3	6.8	3.7	7	7	
TAS North	17.2	11.7	13.4	18.2	-5.5	1.6	4.9	1.0	8	14	
NSW Central Coast	14.6	10.1	13.5	17.3	-4.5	3.4	3.8	2.7	9	21	
Melbourne City	15.9	13.7	18.0	17.3	-2.3	4.3	-0.7	1.4	10	48	
Average unemployment rate	14.7	11.0	13.2	20.0	-3.7	2.2	6.8	5.3			
Australia	13.4	9.5	11.5	13.1	-3.9	2.0	1.6	-0.3			

Table 5.10 shows that in some regions, unemployment rates for the 15 to 24 year-old cohort remain high. In 2017 the ten regions with the highest headline unemployment rate for 15 to 24 year olds have an average unemployment rate of 20 per cent against a national average unemployment rate for this cohort of 13.1 per cent. This compares to average unemployment rate in 2016 of 17.8 per cent against a national average unemployment rate for this cohort of 12.6 per cent. The range of the ten highest unemployment regions for this group of young people in 2017 is between 17.3 per cent (Melbourne City) and 25.1 per cent (NSW South Coast). This compares to a range of between 16.4 per cent (NSW Northern Inland) and 25.9 per cent (QLD Far North Torres) in 2016.

NSW South Coast with the highest unemployment rate for this cohort has 2,400 unemployed young people. The largest numbers of unemployed in this cohort in 2017 (see Table 5.13) are in SEQ Brisbane City at 15,500, Melbourne Western at 13,100 and Sydney Mid West at 9,300. Both inner and outer city regions continue to have significant numbers of unemployed 15 to 24 year olds. In 2017, there were 276,300 unemployed 15 to 24 year olds in Australia.

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Table 5.11 Youth unemployment rate (aged 15 to 24 years): Lowest unemployment rate regions										
					Change				Rank out of 67	
SOR name	2002	2007	2012	2017	2002- 2007	2007- 2012	2012- 2017	2002- 2017	2017	2012- 2017
WA Pilbara Kimberley	11.5	6.6	5.5	4.1	-5.0	-1.1	-1.4	-7.5	67	54
WA Gascoyne Goldfields	15.5	9.0	7.6	5.6	-6.5	-1.4	-2.0	-9.9	66	56
VIC Loddon Mallee	14.2	10.0	11.5	6.7	-4.2	1.6	-4.8	-7.5	65	65
Sydney Near West	7.6	12.3	11.8	7.0	4.7	-0.5	-4.8	-0.6	64	64
VIC Grampians	15.9	10.9	14.2	7.2	-5.0	3.3	-6.9	-8.6	63	67
NT Darwin	14.3	6.3	7.6	7.6	-8.0	1.3	0.0	-6.7	62	43
Sydney South East	9.3	5.5	9.2	7.9	-3.7	3.6	-1.3	-1.3	61	53
NT Lingiari	12.9	8.1	12.2	8.0	-4.9	4.1	-4.2	-4.9	60	63
VIC South West	8.4	9.2	11.5	8.9	0.8	2.3	-2.6	0.5	59	59
Sydney Metropolitan Core	8.1	7.5	10.7	8.9	-0.6	3.2	-1.8	0.8	58	55
Average unemployment rate	11.2	8.6	10.5	7.4	-2.6	1.9	-3.0	-3.8		
Australia	13.4	9.5	11.5	13.1	-3.9	2.0	1.6	-0.3		

Table 5.11 shows that in 2017, the ten best performing regions had an average unemployment rate for the 15 to 24 year-old age group of 7.4 per cent when compared to a national average of 13.1 per cent. In 2016 the average unemployment rate for this cohort was 7.1 per when compared to the national average of 12.6 per cent in 2016. In 2017 the range of the ten lowest unemployment regions for this group of young people was between 4.1 per cent (WA Pilbara Kimberley) and 8.9 per cent (Sydney Central).

Table 5.12Youth unemployment rate (aged 15 to 24 years): Regions of fastest rise in unemployment rates2012 to 2017										
					Change Rank out o				ut of 67	
SOR name	2002	2007	2012	2017	2002- 2007	2007- 2012	2012- 2017	2002- 2017	2017	2012- 2017
WA Wheatbelt Great Southern	8.4	5.2	6.0	22.1	-3.1	0.8	16.1	13.7	4	1
NSW South Coast	15.8	16.9	15.9	25.1	1.1	-0.9	9.2	9.4	1	2
QLD Townsville North West	11.8	9.2	15.4	23.5	-2.6	6.2	8.1	11.6	2	3
QLD Far North Torres	12.9	6.9	12.2	20.2	-6.0	5.2	8.0	7.3	5	4
QLD Wide Bay Burnett	19.4	10.9	15.1	23.0	-8.5	4.2	7.9	3.6	3	5
Melbourne Northern Outer	14.7	11.5	12.5	19.5	-3.1	0.9	7.0	4.8	6	6
Adelaide North	15.0	13.2	11.9	18.8	-1.8	-1.3	6.8	3.7	7	7
NSW Murrumbidgee	11.7	8.1	7.6	13.5	-3.6	-0.5	6.0	1.9	29	8
NSW Orana	8.7	10.7	7.7	13.4	2.0	-3.0	5.7	4.8	31	9
NSW Inland Hunter	16.2	6.5	4.9	10.6	-9.7	-1.7	5.7	-5.6	49	10
Average unemployment rate	14.2	10.5	11.7	18.9	-3.6	1.2	7.2	4.8		
Australia	13.4	9.5	11.5	13.1	-3.9	2.0	1.6	-0.3		

Table 5.12 shows the regions with the fastest rates of unemployment rise for 15 to 24 year olds. WA Wheatbelt Great Southern had the most change with a decline in employment of 16.1 per cent in the period 2012 to 2017 reflecting the general employment outcomes in regions where agriculture predominates. Remote and outer metropolitan regions are also at risk. In 2017, the average unemployment rate for young people in the most rapidly declining regions was 18.9 per cent.

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Table 5.13Youth unemployment all SOR regions by SOR order (aged 15 to 24 years): Numbers unemployed										
		Numbe	r ('000)		Change ('000)				Rank out of 67	
					2002-	2007-	2012-	2002-		2002-
SOR name	2002	2007	2012	2017	2007	2012	2017	2017	2017	2017
Sydney Metropolitan Core	2.5	2.1	2.8	2.6	-0.4	0.7	-0.2	0.1	39	40
Sydney Eastern Shores	3.4	1.5	3.3	2.5	-1.9	1.8	-0.8	-0.9	40	59
Sydney Mid West	7.3	6.9	10.0	9.3	-0.4	3.1	-0.6	2.0	4	9
Sydney Near West	1.8	3.1	2.4	2.1	1.3	-0.6	-0.4	0.2	49	31
Sydney Outer Northern Shores	3.8	3.5	4.7	5.2	-0.3	1.2	0.4	1.4	21	17
Sydney Outer South West	6.1	7.0	5.1	6.0	0.9	-1.8	0.9	-0.1	16	46
Sydney Outer West	5.3	7.4	5.9	6.7	2.1	-1.4	0.7	1.4	15	16
Sydney Parramatta Ryde	2.6	2.1	3.4	4.8	-0.5	1.3	1.4	2.1	23	6
Sydney South East	3.1	2.1	3.5	2.8	-1.1	1.4	-0.7	-0.3	36	50
NSW Central Coast	3.5	3.2	4.6	5.9	-0.4	1.5	1.3	2.4	17	5
NSW Central West	3.1	1.2	1.9	2.1	-1.9	0.7	0.2	-0.9	47	60
NSW Coastal Hunter	7.0	5.9	4.7	5.2	-1.2	-1.1	0.4	-1.9	20	64
NSW Illawarra	3.8	5.0	3.1	4.5	1.2	-2.0	1.4	0.7	25	26
NSW Inland Hunter	2.0	0.9	0.8	2.0	-1.1	0.0	1.2	0.1	50	41
NSW Murray Far West	1.3	0.9	1.2	1.4	-0.4	0.2	0.3	0.1	57	35
NSW Murrumbidgee	1.7	1.2	1.1	2.2	-0.5	-0.1	1.1	0.5	45	28
NSW North Coast	4.6	3.5	2.7	3.7	-1.1	-0.8	1.0	-0.9	29	58
NSW Northern Inland	2.3	1.5	3.1	2.5	-0.8	1.6	-0.6	0.2	41	32
NSW Northern Rivers	4.0	2.6	2.8	3.4	-1.4	0.3	0.5	-0.6	31	54
NSW Orana	0.6	0.8	0.7	1.5	0.2	-0.1	0.8	0.9	53	19
NSW Southern Tablelands	1.2	1.3	1.0	1.5	0.1	-0.3	0.4	0.3	55	30
NSW South Coast	1.5	1.8	1.8	2.4	0.3	0.0	0.6	0.9	42	20
Melbourne City	1.4	1.3	1.8	1.5	-0.1	0.5	-0.3	0.1	54	34
Melbourne Eastern Inner	5.3	4.6	4.5	7.2	-0.7	-0.1	2.7	1.9	13	12
Melbourne Eastern Outer	6.2	4.8	5.6	4.9	-1.4	0.8	-0.8	-1.3	22	62
Melbourne Northern Inner	4.8	4.6	5.7	7.4	-0.2	1.2	1.7	2.6	11	3
Melbourne Northern Outer	4.5	4.2	4.3	7.8	-0.3	0.1	3.5	3.3	10	2
Melbourne Southern Inner	6.4	4.9	8.2	8.3	-1.5	3.3	0.1	1.9	7	11
Melbourne Southern Outer	5.8	4.7	6.4	7.9	-1.1	1.7	1.5	2.1	9	8
Melbourne Western	7.8	8.4	10.5	13.1	0.6	2.1	2.6	5.3	2	1
VIC Geelong	2.2	2.6	2.3	2.4	0.4	-0.4	0.1	0.2	43	33
VIC Gippsland	2.6	1.9	3.0	3.2	-0.7	1.1	0.3	0.7	33	24
VIC Grampians	3.4	2.2	2.9	1.5	-1.2	0.8	-1.5	-1.9	56	65
VIC Hume	2.9	1.9	2.8	3.6	-1.0	0.8	0.8	0.7	30	25
VIC Loddon Mallee	3.9	2.9	3.2	1.9	-1.0	0.3	-1.3	-2.0	52	66
VIC South West	1.1	1.3	1.6	1.2	0.2	0.3	-0.4	0.1	62	39
SEQ Brisbane City	14.9	7.5	12.3	15.5	-7.4	4.9	3.2	0.6	1	27
SEQ Gold Coast	5.5	3.2	6.3	7.1	-2.3	3.1	0.7	1.5	14	15
SEQ West Moreton	4.5	2.3	3.5	3.9	-2.2	1.2	0.4	-0.6	28	56
SEQ Logan Redland	7.5	4.8	5.9	5.4	-2.8	1.1	-0.4	-2.1	18	67
SEQ Moreton Bay	4.6	3.5	4.8	4.3	-1.1	1.3	-0.4	-0.2	26	49
SEQ Sunshine Coast	4.4	3.1	3.6	2.8	-1.3	0.5	-0.9	-1.7	38	63
QLD Darling Downs South West	2.2	1.4	2.7	2.1	-0.8	1.2	-0.5	0.0	46	44
QLD Far North Torres	2.6	1.6	3.4	3.3	-1.0	1.8	-0.1	0.7	32	23
QLD Fitzroy Central West	3.3	1.8	2.6	3.2	-1.6	0.8	0.6	-0.2	35	47
QLD Mackay	1.5	0.6	0.9	2.2	-0.9	0.3	1.3	0.7	44	22

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Table 5.13Youth unemployment all SOR regions by SOR order (aged 15 to 24 years): Numbers unemployed (continued)										
		Numbe	r ('000)		Change ('000) Rank out of					ut of 67
SOR name	2002	2007	2012	2017	2002- 2007	2007- 2012	2012- 2017	2002- 2017	2017	2002- 2017
QLD Townsville North West	2.8	2.5	4.3	5.3	-0.2	1.8	1.0	2.5	19	4
QLD Wide Bay Burnett	3.7	2.2	3.2	4.5	-1.5	1.0	1.4	0.8	24	21
Adelaide South	7.3	5.4	6.3	7.2	-2.0	1.0	0.9	-0.1	12	45
Adelaide North	7.7	7.7	6.9	9.4	-0.1	-0.7	2.5	1.7	3	14
SA East	1.4	1.1	1.3	1.4	-0.3	0.1	0.2	0.0	58	42
SA Far North and West	0.9	0.8	0.6	0.7	-0.1	-0.2	0.1	-0.2	65	48
SA Fleurieu	1.1	0.8	0.9	1.2	-0.3	0.1	0.3	0.1	61	36
SA North	1.4	1.1	1.3	1.4	-0.2	0.2	0.1	0.0	60	43
Perth Central	6.5	3.7	5.3	8.2	-2.8	1.6	2.9	1.7	8	13
Perth Outer North	6.4	3.8	5.6	8.4	-2.6	1.8	2.8	2.0	6	10
Perth Outer South	6.3	3.2	6.1	8.5	-3.1	2.9	2.3	2.1	5	7
WA Gascoyne Goldfields	1.7	0.9	0.9	0.7	-0.8	0.0	-0.2	-1.1	66	61
WA Peel South West	2.4	1.2	2.8	2.8	-1.1	1.6	0.0	0.4	37	29
WA Pilbara Kimberley	1.0	0.5	0.5	0.4	-0.5	0.0	-0.1	-0.6	67	55
WA Wheatbelt Great Southern	0.7	0.6	0.6	1.9	-0.1	0.0	1.4	1.2	51	18
TAS Hobart South	3.9	2.5	2.9	3.2	-1.4	0.4	0.3	-0.7	34	57
TAS North	2.0	1.6	1.7	2.1	-0.4	0.2	0.4	0.1	48	37
TAS North West	1.8	1.6	1.7	1.4	-0.2	0.0	-0.3	-0.4	59	51
NT Darwin	1.5	0.7	1.0	1.0	-0.8	0.4	0.0	-0.5	63	52
NT Lingiari	1.2	0.7	1.0	0.7	-0.5	0.3	-0.3	-0.5	64	53
ACT	3.9	3.1	3.6	4.0	-0.7	0.5	0.4	0.1	27	38
Australia	247.4	191.3	238.2	276.3	-56.1	46.9	38.1	28.9		

NIEIR's research for the 2015 Melbourne's North future workforce report confirmed that leaving school early was a bad idea. For school leavers who did not complete Year 12, who were living in the region and not in education or training, almost 53 per cent were not in employment. For those young people who had left school before completing year 12 who were working, 11 per cent were occupied as *Sales assistants and store persons* and just under 10 per cent were employed in *Food, hospitality and tourism.* For this cohort the direct path to university was almost non-existent.

In this region the most common field of study for residents 24 years or under who held a bachelor or postgraduate qualification was management and commerce at 25 per cent. The second most common field of study for this group was society and culture, with 17 per cent of qualified residents holding bachelor and postgraduate degrees in this group of subjects.

The most common field of study for residents 24 years or under who held certificate or advanced diploma qualifications was management and commerce at 25 per cent. The second most common field of study at Certificate or Advanced Diploma level was food, hospitality and personal services, with 19 per cent of Certificate and Advanced Diploma qualified residents.

The young (aged 15 to 24 years) are predominantly employed in occupations that offer opportunities which do not require post-school qualifications. Consistent with this, two in every five Sales Workers and one in four Labourers are aged 15 to 24 years.

Occupations which employ the highest number of young people include:

- General Sales Assistants;
- Checkout Operators and Office Cashiers; and
- Waiters.

In 2016 the largest employer of young people was Retail Trade at 22.7 per cent of all those in employment in the age category, followed by Accommodation and Food Services at 20 per cent and Construction at 9.4 per cent. These three sectors accounted for 52.1 per cent of total employment for this cohort. Health Care and Social Assistance (a jobs growth sector) and Manufacturing (a jobs decline sector) are in the second tier of employers of the 15 to 24 year old age group, at 8.1 per cent and 5.9 per cent respectively.

5.10 Employment and unemployment in Indigenous Australia

The previous State of the Region's reports have tracked the circumstances surrounding Indigenous employment and unemployment. Table 5.10 gives the unemployment and workforce participation rates for remote and non-remote Indigenous populations and is in effect an update of the findings in the 2016 report.

It remains important to recognise, that unlike the ABS monthly labour force survey, the NATSISS collected labour force data represents a point in time for the Aboriginal and Torres Strait Islander over 15 year old populations.

Changes in policy have consequences and this has occurred in terms of the employment data collected from Indigenous communities. At the time the 2008 NATSISS data was collected the Community Development Employment Projects (CDEP) was in operation and this scheme was regarded as an opportunity for Indigenous people to engage in training and employment activities in Aboriginal and Torres Strait organisations.

CDEP was introduced in 1976-77 by the Fraser Coalition Government and funds were provided to undertake intentionally meaningful projects and employment. This represented an opportunity for Indigenous people to exchange unemployment benefits for work. This scheme was popular and endured until its demise from mid-2013. The enduring CDEP, was replaced by the Remote Jobs and Communities Program (RJCP), which is an employment support service in remote communities. It can be argued that this change takes us full circle and back to a period pre the introduction of CDEP. So reflecting the change in emphasis of the new policy this is the situation in regard to the data. In 2008 CDEP participants were classified as employed as was the case. The 2015 data describes the circumstances of participants in RJCP who are classified as either unemployed or not in the labour force.

There are of course many layers to this story, some very good, and others poor. Educational opportunities are shown to improve Indigenous employment opportunities, complications with access to education can make progress through the different levels of education difficult. Discrimination in employment practices and regional availability of jobs aside, indigenous people show a similar pattern to non-indigenous people when it comes to levels of education and employment opportunities. Leave school early and the lower the level achieved, the more onerous the task of seeking employment. Indigenous people also have their own cultural commitments, which are paramount and these cultural requirements are unlikely to fit non-Indigenous notions of work and the workplace.

In their 2013 analysis of Indigenous employment, *Indigenous employment: A story of continuing growth* (Centre for Aboriginal Economic Policy Research, ANU College of Arts & Social Sciences) Matthew Gray, Boyd Hunter and Monica Howlett identify a 'very substantial increase' in the proportion of the Indigenous population in non- CDEP employment since the mid-1990s.

Conclusions were drawn building on analysis from data from the 1994 National Aboriginal and Torres Strait Islander Survey (1994 NATSIS) and the 2008 National Aboriginal and Torres Strait Islander Social Survey (2008 NATSISS). The authors describe the approach taken to estimate the 'non CDEP' employment rate was to deduct the number of CDEP participants recorded in administrative data from the total employment number recorded in the census.

Given the cultural shifts in attitudes in Australia over the last 50 years opportunities for Indigenous people to work in the 'non CDEP' workforce have increased in both professional and trade employment. This said, comparing the NATSISS data from Table 5.16, it is possible to compare and report the apparent result of changing from CDEP to RJCP, the biggest change is in remote communities and this is particularly the part of current policy that needs a rethink.

There has been a decline in the workforce participation rate, particularly so in remote communities where the participation rate has fallen from 58.4 per cent in 2008 to 48.6 per cent in 2015, while at the same time unemployment rates in remote communities have risen from 14.7 per cent in 2008 to 27.4 per cent in 2015. This compared to an Australia wide unemployment rate of 6.1 per cent in 2015.

Non-remote Indigenous populations had an unemployment rate of 19.3 per cent in 2015, rising from 17 per cent in 2008. The participation rate also fell from 63.1 per cent in 2008 to 60.7 per cent in 2015. In 2015 the Australia wide workforce participation rate was 64.8 per cent.

Table 5.14	Unemployment rate and workforce participation rates: Indigenous by remoteness and general Australian population								
		2002	2008	2015					
Unemployment rate (%)									
Non-remote	Indigenous	27.5	17.0	19.3					
Remote Indi	genous	10.1	14.7	27.4					
Total Indiger	nous	22.9	16.5	20.6					
Australia		6.7	4.2	6.1					
Participation ra	te (%)								
Non-remote	Indigenous	60.9	63.1	60.7					
Remote Indi	genous	57.5	58.4	48.6					
Total Indiger	nous	60.0	61.9	58.0					
Australia		63.3	65.4	64.8					

Sources: 4714.0 National Aboriginal and Torres Strait Islander Social Survey, Australia, 2014–15 and 6202.0 – Labour Force, Australia, April 2017.

As is true of the population more generally, the youngest Indigenous working-age cohorts had the highest unemployment rates. As we described in the 2016 State of the Regions report, Indigenous populations are more youthful than the population generally so the impact of young people in unemployment is potentially even more severe than in the broader population. The latest available figures show that the unemployment rate for the 15-24 year old age group was 31.8 per cent. The unemployment rate for males was 33.7 per cent, the rate for females was lower at just on 30 per cent. For the 25-34 year old age group, the unemployment rate for men fell to 18.9 per cent. The rate for women in this group was higher at just on 20 per cent.

Where employment outcomes should be strong are in the homeland communities and traditional lands where there are numerous tasks to perform. Many of these tasks are no different to those undertaken by the non-Indigenous counterparts elsewhere in the country. Publicly funded employment should be strong in the areas of environment, the successful ranger program is one example, community care including such things as the management of rubbish and roads, education, including teaching roles, health, science and last, but not least, art making via the art centres. Other employment opportunities exist in the construction industry, engineering and mechanical services and in a range of knowledge economy roles such as new media, cultural exports and professional and scientific services. There is a substantive role for Universities from Australia and elsewhere to engage the services of Indigenous people in both scientific and cultural roles.

In regional and remote Indigenous communities, poor standards of telephony and the lack of proper Internet connections hamper young people in learning and block opportunities in contemporary and emerging industries. In some regions the situation is improving somewhat. Given the possibilities that new technologies provide, there are few excuses why improvements in communication standards cannot continue to be delivered.

As inequality within and between Australian regions grows it would indeed be unfortunate if government policies, particularly in relation to remote communities, amplify disadvantage in some regions and inequality within the Indigenous population as a whole.



Barge at Maningrida, Arnhem Land

5.11 Employment opportunities and the impact of social media on the regional tourism industry

Social media can create extraordinary patterns of behaviour for the tourism sector. One example is how, and unexpectedly so, social media can make a particular destination an unplanned global tourist hotspot. Because that place did not think of itself or market itself as a global tourist destination it is unlikely to have the infrastructure or knowledge of developing a tourism sector. Nor is it likely to have the capacity to develop tourism in a way that benefits the region.

Then the question becomes how does a region begin to develop an opportunity created, literally out of the blue, by social media, and an opportunity which may well disappear as fast as it arrived?

Without adequate infrastructure and resources, high levels of visitation by tourists can create major problems for a region. Road congestion, safety issues, adequacy of accommodation and hospitality and environmental issues such as littering or destruction of fragile environments can all become serious problems, not to say costly ones. The other side of this story is of course the range of opportunities, and with the right kind of planning, that might make a considerable difference to a region and its towns in terms of business opportunities and employment.

Tourism is a labour-intensive industry and it requires access to a workforce with experience in delivering services such as food and accommodation, transport and information based services, tour guides and so on. Expectations from the tourists are high because their leisure time is a precious commodity and no doubt this is increasingly the case. We should remember that expenditure by tourists generates a lot of jobs per dollar spent, but that many of these jobs are low-wage, casual or seasonal. So for remoter regions these factors complicate matters further.

To define the economics of tourism, at the regional level, the fundamental economic significance of tourism is that it is both an export and an import industry. Exports are generated when people from other places visit the region; imports arise when residents travel to other places. Australia as a whole earns export income from overseas tourists but pays for imports in the form of its residents' spending on overseas travel.

ABS and Tourism Research Australia data shows the tourism and visitor numbers to Australia are growing, much of the international growth in tourism was driven by China with an increase in visitor numbers of 32 per cent in 2016 to 1.2 million visitors. In 2016 the number of overall arrivals to Australia rose by 11 per cent on the previous year to 8.3 million visitors, generating expenditures of \$39 billion (to which visitors from China contributed 9.2 billion), an increase of 7 per cent over the previous year. Tourism from Japan also appears to be bouncing back with a growth in visitors of 20 per cent in 2016. Catering appropriately for tourists from Asia is vital to ensure the potential of the industry is realised, while the city regions have high quality infrastructure in terms of hotels and restaurants and tourist activities including cultural infrastructure and events, non-city regions into which Chinese tourists are now heading, are far less likely to have adequate infrastructure to cater for these guests.

In the 2016 State of the Regions report the following observation was made, 'the industry now faces the problem of overcoming the effect of some years of low investment, both in new facilities and in the maintenance and upgrading of old facilities and attractions. This was particularly the case in places where international tourism had declined because of the high value of the Australian dollar during the mining investment boom'. The point was also made that 'the tourism sector is sprightly and revival of the sector should be easier than it is for manufacturing which has much longer investment lead times and accordingly cannot revive quickly'. The view was that over the next few years, tourism was likely to bounce back as a bright spot in the Australian economy.



So all this said we return to the impact of social media and the Internet on patterns of visitation. Much of it unexpected and a high profile example here is the large number of Chinese tourists visiting Lake Tyrrell and the nearby town of Sea Lake. Lake Tyrrell is a salt lake with a highly reflective surface from its shallow waters, and unlike much of China, the night sky above Lake Tyrrell is clear and the stars above are a spectacular site, as is the sunrise and sunset with their glowing colours of red. There is little or no infrastructure at the lake site.

The Lake has become a must see for many Chinese tourists who take photos of the lake and its reflections, of family and friends reflected in the lake with sky and stars and selfie sticks are common.

The Buloke Shire Council, in which the lake is situated, is confronted with the task of dealing with the large amounts of rubbish left by the visitors. There are coach loads of visitors arriving as well as numerous visitors in hire cars. Some of these cars drive onto the lake surface where they get stuck and the occupants and cars then have to be rescued. Plastic sheeting is used in the rescue attempt and whatever else is to hand. So this all adds to the rubbish at the lake as well as causing a significant amount of damage to the lakes reflective surface.

A role for council might be to facilitate the opportunities for local businesses to provide the services this new form of tourism requires as well as providing the infrastructure the higher levels of visitation require such as improving roads to the lake itself. In the longer term it might be possible to build some kind of tollgate so the visitors to the lake help to pay for some of the costs of cleaning up rubbish left at the lake and contribute to the costs of maintaining roads.

Connecting businesses with new opportunities is important, if new businesses want to set up in Sea Lake council may have a role in assisting them to do that where we can. Given the rural and agricultural nature of the shire capacity to engage in very different forms of economic development can be a problem.

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Developing tourism in Buloke Shire is not without its difficulties. One issue is that the lake only has water for three or four months of the year, so when Lake Tyrrell is dry there are no reflections and the reflections of the stars and sky are the reason why the tourists come to the lake to take their photographs. When the season starts again it is likely that numbers are going to increase yet again so 500 to 600 or more vehicles, many of which are coaches, on the lake road each day is a probability. It is also very hard to know if this kind of tourism is a one-day wonder or something that will continue. Swan Hill is a 45 minute drive away and is much better able to handle the number of tourists passing through the shire.

The community would like to see the region capture the opportunity and that relies on the Chinese visitors being a long-term proposition.

There are further complications regarding the idea of building a sustainable and growing tourism industry centred on Lake Tyrrell and its reflections of the sky. This will not be an easy task because ownership of land, liability issues and so on.

So for a council that has little or no experience with tourism the impact from social media creates a lot of issues, including having staff with the appropriate skills to deal with the issues. Because of the rural nature of the shire it is unlikely that council would have the resources to spend money on experts and this means that it is difficult to maximise the benefits and minimise the costs in ways that this should happen.

Local government can apply for grants to help with infrastructure related issues but once again it is difficult to know how much should be spent on developing this form of tourism. The shire will need the infrastructure that will help tourists get the best from their experience while visiting Lake Tyrrell. Another difficulty is that whatever is developed it should not create light pollution that obscures the perfect views of the night sky, this creates yet another catch 22 situation.

These are all issues that a small regional council will find difficult because there is likely to be a lack of knowledge in developing tourism as a successful local industry and to manage the range of issues associated with this development. Advice and assistance from State Government is valuable here and tourism development, nature based tourism, taking in the regions wetlands and rivers, birdlife, history and ecology might be the answer in creating a sustainable and long lasting industry.



Sunset over Lake Tyrrell

6. Intelligent communities: Intersecting economic development, social capital and technology³

6.1 Overview

The term smart cities is often aligned to the deployment of smart technology such as Internet of Things (IoT) devices such as sensors to improve efficiency, leading to improvements in overall liveability. Real-time traffic management, real-time energy consumption management, integrated public transport networks and data collecting sensors are examples of smart technology contributing to the efficiency of a modern city. These technology based networks generate large volumes of data which is analysed and leveraged in real-time decision making.

The Australian Department of Prime Minister and Cabinet amongst others, defines smart cities to include, "support for productive, accessible, liveable cities that encourage innovation and create jobs and growth, with a commitment in both regional and metropolitan areas for smart investment, smart policy, and smart technology" (PM&C, 2016).

InnovationAus.com provides another perspective using the term intelligent community which includes "all forms of infrastructure and data analytics, knowledge creation, talent attraction and digital inclusion, 'intelligent communities' create collaborative innovation ecosystems that encompass environmental, economic and social sustainability, as well as good governance and citizen participation in the community's planning and development" (InnovationAus.com, 2016). The phrase "create collaborative innovation ecosystems" takes the networking dimension beyond technology to include people and communities.

In this discussion paper, we propose to expand the "intelligent community" narrative by incorporating the technology aspects of a smart city, with parallel investment in social capital and liveability factors contributing to better outcomes through a virtuous circle effect. An intelligent community leverages data for business insight leading to innovation which is business and people driven rather than technology led.

The challenge for many communities is the lack of capacity and capability to derive value from data assets for innovation to occur. Higher levels of governance can generate value for all communities through investment in common platforms for hosting open data. This would empower communities to leverage publicly accessible data assets to derive business insight needed to enable community initiated innovation.

³ A discussion paper from the SAP Institute for Digital Government (SIDG); released 16 March 2017; InnovationAus.com Intelligent Communities 2017, Melbourne Forum; Brian Lee-Archer, Belinda McKeon; www.sap.com/sidg; digitalgovernment@sap.com.



6.2 A new intelligent communities narrative

While there are many definitions for a smart city addressing the domains of social, economic, governance and environmental matters, there has been a coalescence around technology related solutions to address the issues of modern urban living (Townsend, 2013). This results in a smart cities narrative which can be narrowly focused on issues where industrial scale technology based solutions can be applied i.e. mass transportation, energy and water management and asset maintenance.

It is a challenging environment for public policy makers as they work through the maze of high-tech solutions on offer, each targeting various aspects of complex problems facing communities. A top-down approach can stall within traditional governance structures established around multiple layers of competence where lines of accountability and responsibility are not clear and/or overlap. A bottom-up approach to innovation for addressing complex communities in looking forward to create opportunity for growth, e.g. upskilling for the jobs of tomorrow, rather than permanently locked into solutions for today's problems e.g. traffic congestion.

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For the technology industry, there is an important role to play in enabling this bottom-up innovation. Innovation occurs at the intersection of business insight and technology (Donofrio, 2006). Business insight comes through leveraging data. While there is an avalanche of new data emerging to drive new insights leading to innovation, what is lacking is the capability and capacity at a community level to make effective use of it. Rather than just addressing problems, innovation creates opportunities for progress leading to improvements in liveability and social capital.

A new narrative for an intelligent community is proposed which brings the focus back to the interlocking domains of social, economic, environmental and governance. An intelligent community leverages its resources, including data, to promote innovation for building community capacity.

Technology is the enabler for innovation through data for the deep insight to generate ideas and for the products and services to make these ideas become a reality.

An intelligent community narrative suits the Australian context with its relatively stable and highly urbanised population, coupled with smaller communities spread over a vast landmass, administered through a three tiered system of government – federal, state and local. An intelligent community narrative is globally relevant as it is not tied the rate of urbanisation which varies between countries. Communities are by definition inclusive whereas cities are exclusive to large urbanised populations. Communities are not necessarily bounded by formal government areas of responsibility. Within cities, communities can be a neighbourhoods or even a single street while in rural areas a community may be a village or commune. Small communities will associate with similar, like minded communities to form larger communities which may or may not align to formal government administrative areas.

For the purposes of this paper the definition of "community" is kept as place based. Characteristic based communities, such as sporting associations, trade unions and schools, crossover place based boundaries and individuals can be members of one or more of these groupings.

Urbanisation continues around the world with masses of people migrating to cities for employment opportunities and lifestyle. Meanwhile, the significant number of people remaining in the urban fringes, smaller towns, and rural areas, for example in Australia, can feel left behind as public policy attention is drawn towards the well documented problems of larger urban centres. As cities expand however, they are dependent on a growing ecosystem of communities (urban and non-urban) that are mutually reliant in supplying labour, produce, raw materials, goods and services. An intelligent community understands and manages its contribution and what it receives through the ecosystem. It is focused on making their community visible as an attractive place to live through good governance and a commitment to economic, social and environmental sustainability.

The paper examines an intelligent community in the context of liveability. A guide is provided for public policy makers to consider an intelligent community across the dimensions of social capital (which for this paper is an amalgam of attributes spanning the social, economic, governance and environmental domains) and enabling technology.

This approach provides a framework to examine communities, large through to small, in terms of their current state and for establishing a pathway for innovation to occur leading to an intelligent community.

A trend towards inequality – The 2016 State of the Regions Report

Over the last four years the Sydney region, Australia's largest city with approximately 5 million inhabitants making up just over 20 per cent of the national population, has been increasing its share of national population and employment, and improving its productivity and income differentials compared to the rest of the nation.

As would be expected, the regions with the largest increases in productivity, as reflected in relative growth in earnings per hour, are in the main regions which have contributed the most to Australia's overall GDP growth over recent years. Over the 2014-2016 timeframe, the Sydney Central region contributed 19.8 per cent to Australia's overall GDP growth. During this period the Sydney metropolitan area also contributed just under a third of the increase in national GDP.

Between 2014 and 2016, two thirds of Australia's economic growth occurred in the Sydney, Melbourne, Perth and Pilbara-Kimberley regions. While the Melbourne region's current contribution to growth equals its share of national GDP, the Sydney region is significantly increasing its share.

For most other regions the contribution to national GDP growth between 2014 and 2016 was less than their contribution between 2000 and 2012. This is particularly true for the Queensland regions. The current contribution of Brisbane City to national GDP growth is less than 15 per cent of its contribution from 2000 to 2012.

The unequal distribution of economic growth inevitably leads to rising levels of income inequality and social disadvantage between regions. However, as evidenced by Sydney, is there a case for making Sydney an even larger city for the sake of national GDP growth, or is this a wake-up call to ensure other regions are encouraged and supported to contribute to productivity and GDP growth or face a growing inequality gap? While Sydney is contributing a growing share of national GDP growth, it is coming at a cost which could eventually see growth stall or even decline. This is evidenced by rapidly declining levels of housing affordability which is now a significant social, economic and political issue. Intelligent communities will have to recognise emerging and rising inequality, as both a social and economic issue, and take steps to address it.

This report can be found on ALGA's website: http://alga.asn.au/?ID=165.

6.2.1 Intelligent rather than just smart

Much of the broader smart cities narrative revolves around commonly quoted statistics demonstrating the seemingly inevitable shift of the global population to cities. For example, in 2014 54 per cent of the world's population lived in urban areas. By 2050, this statistic will be around 70 per cent (UN, 2014). However, for countries like Australia and the United States, where the rates of urbanisation are already in the 80-90 per cent range (CIA, 2015), these broader statistics are not so relevant.

These statistics are often positioned as a burning platform for action focused on addressing the problems resulting from this rapid and at times uncontrolled growth. However, for developed countries like Australia where the urbanisation rates are more stable, there is more scope for an innovation led approach for making communities intelligent, from the largest through to the smallest. While the smart city agenda often concentrates on the issues of mass urbanisation, there remains a significant number of people in countries like Australia who are not living in cities.

While small in percentage terms, they still constitute a major grouping of people albeit spread over a wide area of the country. As major cities grow, the viability of these potentially excluded communities becomes important as they contribute to an ecosystem of communities supplying labour, goods and services to support the larger population centres.

Smart city initiatives give rise to significant governance issues as they often involve multiple layers of competency within agencies from across the different levels of government. These initiatives seek to improve things such as transportation systems, energy efficiency, water quality, public safety, emergency management and housing affordability, all with the aim to provide a higher quality of life and to increase the attractiveness of a city for investment (Tachizawa, Alvarez-Gil & Montes-Sancho, 2015).

Within the smart city narrative, cities are often portrayed as a form of autonomous governing units in competition with one another. This leads to a quasi-competitive environment with public officials declaring an aspiration for their city to be "the smartest" in a region, a country or in some cases, the world. For any city rated the smartest or the most liveable, there is likely to be no shortage of people living in these cities that would beg to differ – not just individuals but whole communities experiencing various forms of disadvantage or exclusion.

However, a smart city is a function of the efficiency of the supply chains within the ecosystem of communities within the city and beyond, subject to varying layers and types of governance. This ecosystem represents the cultural, economic and environmental diversity of a country or regional area. This diversity results in a degree of uniqueness for every community, making statements of becoming the smartest city, in comparison to others, overly simplistic.

The competitive aspect of the smart city agenda is frequently represented by showcasing cities/regions as gold standards to be shadowed by others. This approach fails to recognise each city as unique due to factors such as location, governance, population and the natural resource base. As the context for each city is unique, their individual characteristics should be leveraged to optimise the well-being of the communities that make up the city.

6.2.2 Intelligent communities in the context of decentralised systems of governance

The question arises, how relevant is this dominant smart city narrative in the context of a developed country like Australia? Australia is made up of 530 diverse local government bodies of which approximately 400 are classified as regional or rural (Australian Local Government Association, 2017). In a country as diverse as Australia, from large cities such as Sydney and Melbourne through to small country towns and rural communities, a one-size-fits-all approach towards a smarter city will not be effective nor efficient. The investment path towards an intelligent community needs to be tailored by the community according to their individual needs and circumstances, taking into consideration the aspirations of the community and/or groups of communities that make-up the urban centres.

The 21st century smart city concept, often dominated by a technology centred agenda, carries a risk of overlooking vital aspects of what makes communities viable in Australia: population, employment opportunities and social capital. While digital technology will be important in transforming the way cities and communities function, the determinants of success lie within the overarching political, economic, and social factors.

What makes a community intelligent will be determined by its investment in social capital and technology infrastructure, coupled with deep insight into the unique contribution of a community to the supply chain of goods, services and labour within the ecosystem of communities they are connected with. The value and sustainability of these supply chains is a product of the collective intelligence of the communities involved. The leveraging of data to identify where investment is required, according to the needs, strengths and weaknesses across the domains of social capital and technology infrastructure, ultimately determines the resilience and intelligence of a community.

Therein lies a problem – how can evidence be gathered to make informed decisions across the domains of social capital and technology infrastructure, to become an intelligent community? This requires innovation in public policy making where business insight leverages the ongoing developments in smart technology.

For many communities across Australia, there is a lack of skills and capability to derive insight from the digital data that exists today, let alone the mountains of new data coming on stream, in particular from the Internet of Things (IoT). Digital disruption of the workforce and the ongoing shift to a knowledge and services economy creates additional hurdles to overcome. For many communities, it is a question of where to start. Federal and state governments, who rely on a bottom up effort from communities to develop evidence-based investment proposals, may consider fostering the development of new public policy skills within local government administrations which leverage digital data for deep business insight.

6.3 Networks of people and technology to form an ecosystem

Cities are centres of population, commerce, and culture while communities are groups of people living in the same place or having a particular set of characteristics in common. Think city and you may be drawn to cities such as Sydney and Melbourne, or to cities within these capital cities such as Parramatta or Frankston. Take a more regional perspective and cities like Bendigo and Albury come to mind. Change context from city to community and some people will "think big" and consider Sydney a community, while others "think small" and consider community to be the street they live on.

The place based perspective of communities presents challenges from a governance perspective – what body is accountable and responsible for making a community intelligent? Governance within a smart cities framework is often focused around a city council. The council, along with state and federal agencies, considers investments in smart technology and social capital for the city as a whole.

There is a governance risk in demonstrating a deep understanding of community needs and following through with adaptable solutions with people at the centre.

In considering an intelligent community agenda, we need to recognise that communities come in many shapes and sizes. No matter the size, a determinant of sustainability is how individual communities associate with other communities to form ecosystems.

Communities are often seen as proximity-bound, independent entities, but in reality they form ecosystems where symbiotic relationships ensure their mutual sustainability. This happens by trading labour, goods and services. This trading culture depends on efficient infrastructure to enable effective supply chains. The supply chains leverage investment in transportation, telecommunications, utilities and essential services such as health and policing. This trade-enabling infrastructure falls to the level of governance with accountability for social and economic development across all communities.

For the communities within an ecosystem to be intelligent, a level of self-awareness of their function and role in the ecosystem is required. An intelligent community seeks to influence infrastructure related investment decisions which, at a minimum, protect and grow its value proposition to the overall sustainability of the ecosystem. OECD research from 2012 on "Promoting Growth in All Regions," found that "broader-based inclusive growth brings other benefits to countries in terms of equity, resilience and fiscal health." Focusing investment on thriving communities and regions and ignoring those which are struggling to figure out what they contribute to the ecosystem is an error of judgement. "When policy makers focus only on the leading regions, they miss a crucial opportunity to improve aggregate performance." If we accept the OECD point of view, public policy makers must address capability gaps within non-thriving communities to help make them resilient and mutually sustainable.

Due to population size and the benefits of agglomeration, cities are often seen as more valuable parts of the economic model as they contribute a larger proportion of GDP on per-capita basis compared to the contribution from those living outside the cities. However, this view undermines the true value, such as primary production, added by the smaller regions, including the suburban fringes, which the economic success of the cities is dependent upon.

While not every community can be a tourism hotspot or the next Silicon Valley, they have people living in them and they can be innovative by leveraging their community assets. Innovation is a function of the capability and investment in business insight leading to ideas for asset based growth. These ideas leverage the smart infrastructure investments made by higher levels of governance. Business insight comes from data analysis. Mutual sustainability of community ecosystems depends on the trading of data, the raw ingredient for business insight.

Communities need capacity building support to leverage data created within their ecosystem and beyond. This requires collaboration between communities, all levels of government and industry. Collaboration is dependent on a culture of openness and transparency towards data.

Some communities may feel hesitant in sharing data as this may be seen as detrimental for competitive advantage. The potential for community level innovation to occur as a result of data sharing, including aggregation and linkage, can outweigh the downside risks. Insight gained from data analysis, not the data itself, stimulates innovation, creates social capital and enhances social inclusion.

6.4 Liveability, jobs and the workforce of the future

If work isn't the cornerstone of our society, then why so much focus on the jobs of the future and the impact of the digital economy? Labour mobility is a characteristic of a modern, thriving economy. Jobs can attract people to a community; liveability makes them stay.

Holding down a job within a vibrant labour market, underpinned by a strong safety net for those who cannot work, is a key social and economic pillar within modern societies. It is reasonable to assume this will remain so for the foreseeable future, notwithstanding what is regarded as the norm in terms of working life is constantly changing. While there is much debate on the future of work due to digital disruption, work remains central to how communities and individuals function, survive and thrive.

Automation, however, continues to disrupt labour markets with predictions that more than five million Australian jobs, or 40 per cent of jobs which currently exist, will disappear in the next fifteen years due to technology (ABC, 2016). As manufacturing, agriculture and mining jobs are made redundant as a result of automation, the service or knowledge based economy is growing leading to many new jobs. The concept of the knowledge economy involves the view that information and knowledge are key drivers of economic growth and development, and the ability for individuals to effectively produce and use information is a vital skill (OECD, 2001). Innovation and technological change are driving the development of the knowledge based economy through their effects on economic structure, production methods, and consumption patterns (OECD, 2001).
Jobs and liveability go hand-in-hand. Economic activity within a community underpins investment in social capital related initiatives and strong social capital is a stabiliser to the negative effects of economic cycles. The flow-on effects of improving liveability and economic activity can trigger a virtuous circle effect leading to sustainable communities and resilience.

On the other side of the coin, if economic activity slows (i.e. jobs disappear), investment in liveability may decline and put community sustainability at risk. Communities often have limited capacity to influence the macro economic issues which determine labour markets and attract jobs. However, they have a level of control over liveability factors such as open space, public safety and recreational activities. In periods of economic slowdown, the focus on social capital related initiatives contributes to resilience thereby increasing capacity to influence economic activity.

Planning for the future in Wangaratta

Wangaratta is a small rural city with a population of approximately 27,000 people (2015) located in North East Victoria. In 2008, the city in consultation with the community, developed a 2030 vision detailing what they would like the city to look like in the long-term, and how they plan to get there.

A strong focus on liveability factors, such as health services, learning options, social engagement and transport, underpins the 2030 plan. As a measure to build resilience the community is promoting diversification of the local economy while continuing to support current industries (manufacturing, agriculture, service industry sectors). The community demonstrates an understanding of the ecosystem of communities by priding itself in its location which is far enough away for major cities to be rural, and close enough to access them when needed. The plan outlines criteria for success through the following statement:

"Part of our success as a community has been the commitment to think, innovate and be bold to take unprecedented steps into the future. We have created and embraced opportunities as they have arisen. We have learnt from others and been quick to follow in the footsteps of other progressive communities. We openly share what we have done, what we have learnt and endeavour to help others to achieve their visions. This is part of our spirit."

To see the 2030 vision of Wangaratta or find out more about the region, visit: http://www.wangaratta.vic.gov.au/.

6.4.1 Tradable and non-tradable jobs

The new economy is putting a spotlight on the concept of tradable and non-tradable jobs as explained by Enrico Moretti in his book, "*The New Geography of Jobs.*" A tradable job creates goods or services which can be exported to other regions, e.g. knowledge or manufacturing jobs. Non-tradable jobs are usually the local jobs which support people in the tradable jobs, e.g. retail, health services and education. According to Moretti, "a healthy traded sector benefits the local economy directly, as it generates well-paid jobs, and indirectly, as it creates additional jobs in the non-traded sector."

At the macro level, attracting traditional tradable industries such as manufacturing is beyond the reach of many communities. To do so will often require significant infrastructure investment either as an incentive or in response to an industry relocating to their community and this carries considerable risk. However, the new economy provides opportunities to attract or upskill to a new class of tradable jobs at a lower investment risk – the knowledge workers. Knowledge workers have higher average incomes, are mobile and well-educated with a life perspective beyond the community they live in.

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When clustered within communities with other knowledge workers there is potential to engage and leverage existing social capital assets of the community to enable innovation, leading to new jobs with higher levels of job satisfaction. Increasing the pool of knowledge workers within a community lifts demand for local services in the non-tradeable sector – the multiplier effect.

Knowledge workers by virtue of their mobility, have opportunity to exercise choice in where they live. Communities can leverage liveability factors to retain newly upskilled workers and attract new knowledge workers.

While major cities are better positioned for the knowledge economy through population and skills clustering, multiple factors have made the transition for rural communities much more difficult, such as dispersed, small populations and lack of knowledge based infrastructure i.e. high speed broadband. As the demand for knowledge workers increases, the pressure on rural communities to become "knowledge communities" rises. Jobs within knowledge based industries typically include intensive services reliant on the use of technology such as finance, insurance, business, communication and community and social and personal services.

Positioning for the future workforce – Goulburn

Workspace 2580 is a joint initiative of Community Plus Inc. and the Goulburn Mulwaree Council, with the aim to develop strong and sustainable social infrastructure in the community. As an inland local government area located in southern NSW with a population of 29,550 (2015), the Council identified the following service gaps:

- access to community and adult learning;
- building community capacity for social engagement;
- strengthening the social capital and social infrastructure;
- access to consulting services in social and cultural planning, community engagement, project and program evaluation;
- safe and appropriate facilities for professional and outreach service providers working alone or in potentially vulnerable situations;
- opportunities for informal collaboration, networking and mentoring start-ups and entrepreneurs; and
- access to better information technology connection to support online businesses and e-learning.

To address these gaps, the Workspace 2580 initiative is a community funded facility providing co-working spaces for micro business and start-ups, serviced offices and education and training facilities. Workspace 2580 is collaborating with the University of Canberra to provide an ongoing higher education presence. The University is examining opportunities for residents through off-campus workshops, tutorials and video access to lectures.

Co-working hubs with high quality broadband connectivity such as Workspace 2580 can enable small businesses to significantly expand their influence, overcoming "tyranny of distance" issues to connect with local, regional and international markets. A critical success factor is the digital connectivity to harness creativity and share ideas.

To find out more about Workspace 2580, visit: https://workspace2580.cobot.me/.

6.4.2 Towards a virtuous circle of growth

A three-year study (2010-12) conducted by Gallup and the Knight Foundation of 26 communities across the United States, *"The Knight Soul of the Community,"* examined the factors that attach residents to their communities and the role of community attachment in an area's economic growth and well-being. This study revealed three dominant factors – aesthetics, openness and social offerings.

Kick-starting a virtuous circle of growth in employment and liveability is contingent upon a rich source of data and the capability to turn data into information for business insight. Information informs community leaders in making targeted investment decisions addressing social capital factors proven to have a positive impact on tradable job prospects.

Community leaders face a unique challenge; the levers they have most control over are not necessarily the most direct in terms of creating jobs. However, the liveability levers they do control can have a significant impact on creating the environmental conditions for innovation amongst knowledge workers. The economic value created will empower communities to invest further in social capital initiatives.

An intelligent community will adapt to the needs of the modern labour market, while positioning itself to provide jobs for future generations through innovation. An intelligent community will need to manage the risks of over investing in the jobs and workforce aligned to today's economy or the new economy, as the future is hard to predict and picking winners and losers will be challenging. An intelligent community will continue to invest in social capital and liveability factors as these are stabilising forces to mitigate the negative effects of the labour market changes.

Leveraging assets to kick-start a virtuous circle

The town of Temora in the south-east of New South Wales has a population of around 7000 (2014) people and a reputation as the state's "friendliest town." The area is predominantly known for its wheat production and Aviation Museum which creates an attraction for domestic and international tourists and locals every second weekend when the historic war planes are flown.

Temora's aviation history dates back to 1941 when the Royal Australian Air Force set up the No. 10 Elementary Training School there. Although this training school is no longer running, a museum has been setup in its place.

Temora Shire Council is taking advantage of its growing reputation as an aviation friendly town through the development of an Airpark Estate which includes a residential estate and commercial aviation business. Council has created the Airpark Estate to attract recreational pilots and commercial and aircraft related industries to relocate for work and lifestyle.

The investment focus on aviation related industries is having spin-off effects for the Temora community. The population of Temora has grown significantly since 2011, as new residents are drawn to the Airpark Estate.

The most recent Warbirds Downunder event at the Temora Aviation Museum in 2015 attracted 20,000 visitors to Temora, providing both a local and regional tourism boost. The economic benefit of this event to the local and regional economy was \$6.4 million.

The rural town of Temora's focus on aviation is an example of a community leveraging pre-existing assets (aviation history) for economic and social growth.

To find out more about Temora and its aviation industry, visit: http://www.temora.nsw.gov.au/.

6.5 Social capital development

European nations are often stood up as good practice examples of social capital investment, underpinned by the principle of solidarity within their respective social protection models. Local government in most European nations has a relatively strong level of governance with competency in areas such as health, social protection and education in addition to the traditional municipal functions of providing and managing locally based infrastructure. For example, in the Nordic countries local governments are delivering assistive technology, including robotics and sensor technology, for people with disabilities and the elderly, and this has already proven to be successful (Søndergård, 2014).

The wide ranging social and economic impacts of the Global Financial Crisis (GFC) on Europe are well documented, including the negative impacts on local government budgets. At the European Social Network's Annual Conference held in The Hague, June 2016, Frédéric Vallier, Secretary General of the Council for European Municipalities and Regions, lamented that as local governments faced budget cuts impacting on community-based services, municipalities were beginning to focus exclusively on their statutory duties rather than prevention and community building (European Social Network, 2016).

Instead of succumbing to these external forces for retreat from social investment, Ahmed Aboutaleb, the Mayor of Rotterdam said during his keynote address that communities need a strong government that nurtures people's talent and empowers individuals to be active in shaping their local communities, "We are aiming to build a broad, strong common ground with social networks in every neighbourhood ... built around the idea of a 'community of practice' " (European Social Network, 2016).

Mayor Aboutaleb, a Moroccan immigrant to the Netherlands, is an inspiration for communities across Europe. His approach recognises that it is more than just geographical proximity that contributes to the dynamics of a community; it is the social ties, quality of life, and sense of identity that determines a community's liveability and functionality. His focus on empowering individuals encourages a people centric model promoting co-creation to address inequality and inclusiveness.

6.5.1 Social capital within community ecosystems

Social capital can be described as the "relationships, attitudes, values and norms that guide interactions amongst citizens and contributes to the quantity and quality of cooperation, and economic and social development of a community" (Iyer, Kitson & Toh, 2005).

If we accept the notion of a liveable city as a function of the efficiency of contributions to the ecosystem and supply chains of communities within the city and beyond to towns and rural areas, there needs to be a focus on the social capital and liveability of these smaller communities, including employment, education and health. Making smaller communities more liveable could enable an equilibrium point of sufficient populations within and outside cities, forming the all-important ecosystem for cities to be sustainable.

Social cohesion and social identities are vital aspects of a community. Without them, a diminished sense of belonging throughout the community will lead to social exclusion and isolation. In communities where isolation and social capital are an issue, the overall prosperity and economic output of communities is affected.

For all communities, large and small, addressing the social determinants of health in a proactive manner through social capital building initiatives can provide more economic value to communities (higher productivity and output of healthier populations) than the traditional provision of health services in a reactive manner. For example, people using wearable devices such as smart watches can opt-in and share their health and activity data for common good. This data can inform a choice architecture to encourage people towards living healthier lifestyles – the nudge approach derived from behavioural economics theory (Thaler & Sunstein, 2008).

Communities low in social capital can focus on jobs, healthcare, playgrounds, sporting and social clubs, and education, increasing functionality of public spaces and adding an element of security to build resilience, contribute to the ecosystem, and ultimately achieve economic development and intelligence (Debertin, 1996).

Addressing the social determinants of health to improve liveability

The Public Health Intelligence (PHI) Hub is proposed as the expert agency for collating nationally gathered data related to, or potentially related to, the health of the Australian public. An initiative of the Health Research Institute within the University of Canberra, the PHI will focus on locality-based gathering of information and the locality-based responses needed in the places where people live. The aim is to use big data, data science and cutting edge analysis to understand and influence current trends in health in Australia. This will be a valuable resource for communities as they examine ways to increase liveability and build social capital.

In a recent article accepted by the international journal, Preventive Medicine for publication in June 2017, researchers associated with the PHI initiative conducted a first assessment of the relationship between neighbourhood walkability and hospital treatment costs – "Neighbourhood walkability and hospital treatment costs: A first assessment" (Yu et al., 2017).

Walkability is based on Walk Score[®] – a publicly accessible index to measure neighbourhood walkability (Walk Score[®], 2015). Based on a range of data sources such as Google, it calculates the shortest network distance to amenities in each of 13 categories that include stores, restaurants, entertainment, schools and parks.

By associating the Walk Score[®] of Canberra suburbs with hospital admission costs for four chronic diseases, the researchers found:

- nearly 80 per cent of the neighbourhoods in the study population were rated car-dependent;
- a 20-unit increase in Walk Score[®] was associated with 12.1 per cent lower hospital cost; and
- a 20-unit increase in Walk Score[®] was associated with 12.5 per cent fewer admissions.

The researchers noted further study was required to identify the mechanisms linking neighbourhood walkability and hospital costs (causality). Notwithstanding, this research provides scientific evidence to support community investment in walk friendly neighbourhoods and towns, leading to potentially significant community and societal wide benefits from a healthier population with fewer (expensive) hospital admissions.

This study can be found at: https://www.canberra.edu.au/research/institutes/health-researchinstitute/annual-reports/reports/Influence-of-Neighbourhood-on-the-Burden-of-Non-Communicable-Diseases-in-the-Australian-Capital-Territory.pdf.

6.5.2 Targeting investment in asset based growth

Targeted investment in social capital factors and technology infrastructure are equally as vital to the functionality and liveability of a community. However, over emphasis on one dimension potentially leaves the other neglected. In order to achieve optimal economic output and quality of life, targeted investment decisions have to be supported by an evidence base. Technology enables communities to collect and leverage digital data to build the evidence base leading to informed investment proposals.

One model to address social capital issues is Asset- Based Community Development (ABCD) (Nurture Development, 2017). ABCD challenges the traditional approach to solving community development problems, which has tended to focus on needs and deficiencies of individuals, neighbourhoods, towns, villages and schools to name a few. Rather than focusing on these deficits, asset-based approaches demonstrate that community assets and individual strengths are key building blocks in ensuring people have a life of their own choosing. This strengths based approach builds on community assets and culture.

In Australia, the Canberra based "Think and Do" tank Urban Synergies Group (Urban Synergies Group, 2016) pursues the "Right to the City" approach (Lefebvre, 1967), a holistic way of improving the quality of life in cities. This approach explores pathways towards enhanced engagement of the citizens towards improved health and well-being, leading to better economic outcomes.

A common element of the ABCD and the Right to the City approaches are community engagement for co-creation and decision making which respects and leverages deep local knowledge. Better economic outcomes are dependent on the community becoming engaged in addressing the issues they can control (liveability and social capital), taking advantage of externalities (e.g. a nearby tertiary education facility) and seeking influence over matters of community importance (e.g. generating tradable jobs).

6.6 Building an intelligent community through digital data

More co-operation across all levels of government is needed to address the issues faced by communities to align top-down major projects and infrastructure initiatives and community led bottom-up approaches towards establishing intelligent communities. Setting the transformation path, as aforementioned, requires public policy makers to have a more comprehensive evidence base to optimise their investments in addressing immediate and long terms issues.

Being the leader of a community and making decisions to address social and economic challenges while leveraging capital intensive infrastructure investments within the communities reach such as new hospitals, universities, public transport systems and telecommunications infrastructure, may seem like a gambler rolling the dice. You know you have to place bets with no control over how the dice will fall. The gambler analogy represents the uncertainty facing community decision makers. Uncertainty is a function of multiple factors, many of which are outside their direct control such as macroeconomic conditions and the timing of major projects.

For example, to address the issue of traffic congestion, the root cause needs to be addressed – where is the traffic coming from and why? While real time traffic monitoring can help to address the problem in the short term i.e. people knowing the best times to avoid the congestion, reducing the volume the traffic coming into a city or passing through a community requires more creative thinking. From a technology point of view, this manifests itself through the effective use of data from multiple sources over an extended period to develop an evidence base for effective decision making.

Of the many worthy ideas on the table, which will lead to a return on investment in terms of liveability (social capital) and/or economic value? Which are short terms fixes and which are those that attack root causes? Which may serve as a catalyst for a virtuous circle of community growth? Developing sustainable and resilient communities is not a game of chance; innovative proposals requiring bold investment decisions carry risk. There is renewed focus in public policy making for risk mitigation through an evidence based approach.

Promoting public data

The Onkaparinga region in South Australia is located just south of Adelaide and is home to approximately 169,000 people (2015). The region places a strong focus on social capital and liveability factors, as well as enabling economic drivers.

The economy of Onkaparinga is built on a number of diverse industries which include wine, food and tourism, but is also beginning to support successful niche industries in technology fields such as medical devices, cosmetics, water, environmental products and advanced manufacturing.

Via the Onkaparinga website, regional data on topics such as employment, wellbeing and economic trends is publically available. This data is structured in a simple and usable manner, including a download function, and can be used to support evidence-based decisions.

To find out more about Onkaparinga or view the data sets, visit: http://www.communityprofile.com.au/onkaparinga.

6.6.1 Evidence-based management

Evidence-based practice as proposed by the Netherlands based Center for Evidence-Based Management (CEBM) is that "good-quality decisions should be based on a combination of critical thinking and the best available evidence." Access to "the best available evidence," while relative, is an underlying principle of evidence-based management. Community leaders are adept at making do with evidence which satisfies the best available test, however, they should aim to expand these sources of evidence to increase reliability. The rapidly growing repositories of digital data is a source all communities need better access to.

A solid evidence base, according to the CEBM, is a combination of data from internal and external sources (customer data, transactional data), scientific data (academic reports, field studies), stakeholder data (community, business consultation, impact analysis) and professional expertise. Professional expertise is the personal experience of decision makers and community leaders.

Digital data is an evidence source exploding in terms of volume, veracity and velocity. Sifting through raw data to make it usable to generate business insight is challenging. As billions of internet of things devices (IoT) are deployed sensing any imaginable activity, this unprecedented scaling up of digital data production is difficult to comprehend, let alone prepare for, in order to derive value.

6.6.2 Common use data platforms

While a smart city lays out infrastructure to collect data, intelligent communities will develop the capability to make productive use of it. Realising data's value requires a robust technology platform to enable simplicity in integration and analysis across multiple sources.

It's not practical for every community to make the large scale technology investments that major cities can undertake. However, this should not deny them the opportunity to enhance the evidence base they have for community level decision making. There are already large amounts of digital data with more coming on stream through smart city infrastructure investments made by larger communities and higher levels of government. Community leaders need access to this data and they need capability to make good use of it.

Governments at all levels around the world are becoming aware of the potential of releasing data traditionally kept within the purview of government or simply the agency that created it. Termed "Open Data," the potential is for government data to unleash significant economic and social benefits if made freely available. However, government data is only part of the picture – the value will rise significantly if it can be linked and compared to data held by the private and community sectors.

The issue is that simply making data available is not enough. Not all government held data is appropriate to be released and the default position for most government agencies is to be naturally conservative. This conservatism is an appropriate approach given the potential risks arising from breaches of personal information, information release not in the national interest, and misuse or misinterpretation of data.

Data released to the public domain within the category of Open Data (refer Figure 6.1) is often difficult to manage, difficult to locate, inadequately structured and described, or is simply dumped in silos across separate portals and not readily published in easily linkable formats. This situation is exacerbated when the data is not collected with a view that it will become "open" at some future date. At times it may seem that government agencies are complying with a centralised mandate for providing open data without due consideration to providing a service for value creation.

Commercial operators are emerging to capitalise on the opportunity to aggregate publicly available government data.

There will be challenges moving forward in finding the right balance in making data open and available via common use platforms in the public interest, while keeping incentives for a viable commercial market providing value-add services.

As the market grows, regulatory and compliance regimes will need to keep pace to ensure data and its derivatives (i.e. products from the refinement of raw data through linkage and combination with other data sources) is managed and protected in a manner that retains public trust in the process.



Data produced and collected by government agencies is a community asset to be valued and shared – how this is done requires common use data platforms with capabilities that include:

- the ability to access common language libraries or data "ontologies" that describe how data should be stored and represented making it easier to link datasets together across different domains and topics;
- complex search functionality that will allow users to navigate the growing volume of data as a rich, organic web in a similar way that we are currently able to search documents;
- analytical applications and software, including machine learning technology, that apply intelligent algorithms and perform analysis of large amounts of data to generate insights that inform evidence-based decision-making and the evaluation of programs;
- visualisation tools bringing data to life in a flexible manner enabling project teams, decision makers and community leaders to perform ad-hoc queries in real-time across various data sources and perform what-if simulations;
- the ability to apply a methodology to identify value in any collection of datasets and help users generate new opportunities and form new insights from the data;
- coding and programming tools that enable users of the platform to build new solutions with existing data e.g. apps, websites, new services, new products;
- dynamic updates as new data becomes available, with automated version control and retention of historical datasets to support the development of longitudinal datasets;

- embedded rules that take into account policy and legislation requirements such as those related to privacy, security, access and confidentiality to protect data published on the platform, including protections against using data to re-identify individuals; and
- the ability to capture data from individuals who opt-in to provide health and activity information via wearable devices and sensors.

Delivering an open data platform with the above capabilities for communities to leverage requires a significant investment addressing government's role as a data provider, user, policy maker and the catalyst for the open community to form – ideally through national, state level collaboration (Chiu et al, 2014). If openness is complemented with resource governance, capabilities in society and technical connectivity, use of open government data will stimulate the generation of economic and social value through four different archetypical mechanisms: efficiency, innovation, transparency and participation (Jetzek et al, 2013).

Using non-traditional data sources to inform planning

The Regional Australia Institute (RAI) partnered with social media company LinkedIn to review jobs and skills markets in regional Australian cities. They focused on five key regional cities – Townsville, the Sunshine Coast and Noosa, Newcastle, Wollongong and Launceston.

Using the RAI's "Great Small Cities" data and LinkedIn's data on its member networks, the RAI was able to start measuring emerging skills trends in real-time. They were able to identify the current skills position of each city through a mix of internal and external connections, industry and skills strengths, mobility of skilled workers, and the skill needs that are emerging.

Visit http://www.regionalaustralia.org.au/home/ to learn more about the RAI and to read this study.

6.6.3 Investing in skills to turn data into insight

There is a community-wide shortage of skills, resources and capabilities in using data effectively to underpin innovation. While there are strong pockets of expertise, the high skilled knowledge workers who can manage open data to information and insight are in short supply.

When using open data, it needs to be assessed in terms of its validity, relevance, and trust. Most data was not collected for the purpose of making it open, so there are challenges when using data for other purposes. Dealing with this complexity does not mean every community leader should have to be a data scientist, an open data expert nor a technology infrastructure specialist. Intelligent communities will find ways to access these high order technology and business skills to turn data into simple to use evidence.

Figure 6.2 is a schematic of the open data platform as the enabler for converting data to information leading to business insight for innovation. As the knowledge base of information and insight develops, machine learning technology can support decision makers as they seek to combine this deep learned insight with the technology and infrastructure layers such as a network of IoT sensors. Innovation, as the intersection business insight and invention, is the product of this process.



Capacity and capability building within communities to turn digital data into insight, is an area for the levels of government with accountability for community wide development to address.

Provisioning community level data management infrastructure on an open data platform commons would be a major step forward towards empowering communities to enhance their evidence base for community based decision making. The business of government could be well served by building capacity and capability within communities for this to happen.

Data analysis skills combined with easy-to-use technology platforms to gain insight from digital data are prerequisites for transformation to an intelligent community. Digital shared services provisioned by larger communities including cities, can enable smaller communities and community ecosystems.

Leveraging data aggregation

The City of Greater Bendigo in Victoria has a population of 108,000 (2015), and is known as the home of community bank, the Bendigo Bank, and for its rich gold mining history.

Bendigo has been partnering with a data aggregator specialising in information related to funding grants across all levels of government. The Bendigo specific website is a tailored version of the data aggregator's public offering, "GrantGuru." By localising the offering, businesses are able to more quickly find grants they may be eligible for. The City's Economic Development Unit have driven this initiative to assist local businesses to attract funding to the city.

To view the Bendigo Funding Finder, visit: http://bendigo.grantguru.com.au/.

6.7 A guiding framework towards an intelligent community

The challenge to becoming an intelligent community is knowing where a community currently stands, deciding where they want to go, configuring the path to get there and finally, execution. As no two communities are the same, these elements vary across communities: there is no one-size-fits-all model.

Calling out a community as intelligent is largely a relative and subjective statement and needs to be used with caution. As communities have so many variables to deal with and while some have significant natural advantages associated with location and resources, it is more valuable for individual communities to focus on demonstrating progress towards their goals rather than participating in an arbitrary competitive process.

Community consultation is key to goal setting, which should be informed by an understanding of the current situation. There is a common saying along the lines of "shoot for the stars and land on the moon" (not attributed). This aspirational turn of phrase seems to imply you know you are standing on earth to start with. For communities considering aspirational goals for becoming an intelligent community, how well do they understand their starting or reference point? While the collective term intelligent community is relative, the attributes of an intelligent community are measurable in quantitative and qualitative terms.

In examining the many attributes of an intelligent community, the next challenge is aggregating the measurable data in a manner that is simple and informative for community members. There is an asymmetric level of knowledge between community leaders and community members and this must be addressed as part of the change management process. Ongoing communication starting with the aspirations through planning to execution and achievement is essential for securing community members' engagement in a co-creation journey towards an intelligent community. The common data platform and associated infrastructure along the lines outlined in the previous section of this paper, provides opportunity for community leaders to address this information asymmetry.

Figure 6.3 shows a simple visualisation framework for positioning an intelligent community in terms of where it currently stands and where it is aspiring to be. This visualisation represents the intersection of an index (not defined) of social capital and smart technology infrastructure attributes.



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For illustration we have defined four quadrants representing stages of maturity towards becoming an intelligent community i.e. happy, smart technology, danger, intelligent. Definitions for each quadrant are briefly described in Table 6.1. As the framework is conceptual, the quadrant descriptions are indicative only.

Table 6.1	Intelligent Community Index
Quadrant	Description
Нарру	High social capital and social identity throughout the community but low economic output and contribution to the ecosystem and supply chain.
Smart Technology	High investment in technology infrastructure, interested in optimising efficiency for citizens through technology such as IoT for traffic management, but without a similar priority of investment in liveability and social capital factors.
Danger	A declining community with low investment in technology infrastructure and investment in social capital is declining.
Intelligent	Targeting investment decisions leading to high social capital and leveraging technology infrastructure, including an understanding of value contribution/position within the ecosystem/supply chain. Well prepared for the knowledge economy and workforce of the future.
Risk Zone	Communities operating at a satisfactory level in terms of today's needs but are at risk of decline – targeted invested in limited social capital and/or smart technology infrastructure may be the catalyst for a virtuous circle effect.

For the framework to be used beyond an internal planning tool by a community and/or comparative analysis between communities, the components for the social capital and smart technology infrastructure indices would need to be defined and measured. This requires on-going research.

6.8 Seven key decision points

Intelligent communities demand a shared focus on social capital development and technology infrastructure. The investment requirements for social capital development or technology infrastructure varies from community to community and there is no one-size-fits-all approach. Creating a roadmap which leads to an intelligent community is a complex governance and public policy question for all arms of government holding accountability and responsibility for community development.

To achieve this requires a sound understanding of where an individual community stands in terms of social capital and technology infrastructure and the investment path from the current state to a prospective state. In this discussion paper we have proposed a simple framework approach to assist policy makers in examining the current state of their communities, large through to small.

Smart technology infrastructure and associated solutions offer many potential benefits for communities. The extent to which each community can take advantage of smart technology infrastructure is dependent upon their resources and capability. The transformation to intelligent communities will follow many different paths. The following seven decision points however, are relevant to all communities, large and small.

The seven decision points for planning an intelligent community are as follows.

- Stocktake assets using the intelligent community visualisation framework as a starting point, assess the social capital and smart technology assets and determine the current state of the community happy, smart technology, danger, intelligent and proximity to the danger zone. Focus on identifying community assets including data assets rather than emphasising the deficits. More research is required to define benchmarks and indices within the framework for comparative analysis between communities. For the time being, communities can use this concept to for a self-assessment approach.
- 2. **Position within the ecosystem** identify the ecosystems you are part of and the value of what you are currently contributing and receiving. Community ecosystems are additional components to the stocktake of assets. Ecosystems are fluid as community fortunes rise and fall and as such positioning in terms of value exchange may need to change. Be open to change and prepared to rapidly amend the community alignment with other communities to form new ecosystems.
- 3. **Co-create with community members** develop an ambitious plan through engaging with the community consult and collaborate with the aim to co-create the catalysts for a virtuous circle effect. Ambition kept realistic based on evidence by leveraging data in line with where the community currently sits as per the visualisation framework.
- 4. **Promote with stakeholders** The bottom-up evidenced based plan is promoted to stakeholders (community ecosystem members) and other layers of government to secure support and to identify opportunities to leverage and capitalise other investment initiatives that are beyond the community/ecosystem.
- 5. **Agile governance** explore ways for making governance more agile, notwithstanding there are legislative and administrative constraints to work within, to keep the community, stakeholders and all layers of government engaged and informed of progress and issues. An example of such an approach would to be use sentiment analysis of social media to measure the mood of the community and to be proactive in responding.
- 6. **Evidence-based investment** invest for success by basing decisions on an evidence based framework that incorporates different sources, including expertise and experience of community leaders.
- 7. **De-risk the journey** risk mitigation through rapid evaluation of initiatives including the use of predictive techniques taking advantage of digital data be agile in changing direction according to the evaluation evidence.

Making sense from the mountains of data already available and what comes on stream as more investment is made via smart based technology, will challenge even the most intelligent of communities. However, what makes this challenging are the governance issues involved – who owns the data, what data can be shared and who invests versus who gains value from an open data common platform within the different layers of government.

A prerequisite for opening up the possibility of a successful transformation journey for all communities across the nation is investment in skills and relevant technology platforms. Empowering communities with these prerequisite capabilities can keep them out of the "danger quadrant" or the "risk zone" of the visualisation framework, and place them on the path to an intelligent community, as defined by them and owned by them.

6.9 Moving forward

Making an intelligent community involves investment in initiatives addressing social capital and economic development objectives within an environmentally sustainable envelope. It is not a case of one versus the other, nor does it mean investment has to be balanced at all times. Investment in digital and smart city technologies will continue to enable better outcomes in both the social and economic domains. Accountability for decision making and responsibility for execution and delivery rests within the governance structures spanning the various layers of competence. Decisions for moving forward, will be informed based on the best available evidence.

The value adding solutions and initiatives arising from these decisions can be high tech or involve no technology at all – what matters is the innovation arising from the insight gained through digital data. We have introduced two new components to enable this, namely:

- 1. the intelligent communication visualisation framework social capital and smart technology infrastructure; and
- 2. the common use data platform.

We have described these components in high level terms within this paper and more work is required to expand these concepts into detailed options for consideration. This work would include feasibility assessments addressing risk, governance, development and ongoing maintenance costs. Funding sources could include a combination of government, industry and communities. The initial work could potentially be funded through the Smart Cities and Suburbs Program (PM&C, 2017).

We recommend approaching a small number of communities demonstrating solid progress towards becoming intelligent communities. These would be offered the opportunity to be lighthouse communities (pilot sites) by demonstrating the art of the possible in terms of innovation through better use of digital data.

As a first step we recommend an existing intergovernmental forum, along with invited industry representatives and communities, to examine this "moving forward" proposal via a working group or roundtable forum.

"Smarter cities are inherently about intelligent communities. We need to be clear that technology remains a tool to restore the balance between the three spaces (the lived, conceived and perceived spaces (Lefebvre, 1991)) and to create solid bridges. Bridges that serve to connect Intelligent Communities need to embrace an ethical code of conduct, which is based on trust and equity. Only if those well-connected and committed islands become the global majority by sharing their wisdom and resources, only then advancements to planetary health and wellbeing outcomes for civilisations is possible."

- Gregor Mews, Urban Synergies Group

Acknowledgements

This paper is published by the SAP Institute for Digital Government. The authors are responsible for opinions and conclusions expressed in this discussion paper. The authors' views do not represent a point of view of SAP SE or an SAP affiliate company.

The discussion paper was developed in close consultation with the Australian Local Government Association (ALGA). Collaboration with ALGA was led by Clare Sullivan, Director of Government Relations and National Events, and John Pritchard, Executive Director of Policy and Research.

The authors thank Professor Rachel Davey Health Research Institute University of Canberra, Dr Girija Chetty University of Canberra, Dr Leonie Pearson Regional Australia Institute, John Morrissey Commonwealth Scientific and Industrial Research Organisation, Peter Hylands National Institute of Economic and Industry Research, and Gregor Mews Urban Synergies Group, who provided commentary and review during the development of this discussion paper. They challenged our thinking which raised the quality of this discussion paper.

We are also grateful to Rolf Fenner from ALGA and our SIDG Associates Thomas Boulton and Kylie Watson who moderated development of the paper and provided deep insights to local government issues.

Photos throughout the chapter provided by the Australian Local Government Association from Dubbo City Council and the City of Mount Gambier. Case studies included in this report are included for illustrative purposes related to the content of this discussion paper and should not be regarded as endorsements of products, organisations or business processes.

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7. Protect your data with an information secure culture⁴

Cyber-related incidents and attacks have come to dominate news headlines in recent years, and for good reason.

Digital platforms are growing exponentially from desktop through to portable devices, and software companies are also driving the storage of information to the Cloud. This proliferation of data and technology, together with the increasing sophistication of targeted cyber-attacks and the potential for human error, mean that the likelihood of a cyber-related incident affecting an organisation's systems, data and reputation is perhaps now greater than ever.

As organisations globally face the threat of cyber-attacks, it is important to be just as aware of the dangers of errors by employees or third party service providers which can lead to cyber security issues.

Recently, a government organisation emailed a survey to a number of constituents, and the employee who emailed the survey accidentally attached the mailing list which incorporated personal details of all recipients with enough information to potentially enable identity theft.

In another example, a large retail chain sent out the names and passwords for gift and voucher cards with a total value of around \$1.5 million to all registered card owners by mistake.

In both of these instances, simple and avoidable errors were made leading to reputational, and in one case, financial damage.

At the forefront of combatting errors by employees and reducing the risk of cyber security issues is employee training. At the end of the day, employees and contractors are human and organisations need to ensure they have adequate security procedures and safe guards in place.

Evidence shows that in most cases, an organisation's lack of engagement with cyber security and appropriate training of staff is a leading cause of these mistakes. The foundation of effective cyber security policy and procedures is a well-developed information secure culture where privacy is seen and treated as an important component to the company's business.

To achieve this, everyone within the organisation needs to be aware they are responsible for the information they hold. Having the carrot rather than the stick approach is also important. Encouraging staff to take proactive steps around information security (for instance by following procedures to report suspicious emails or telephone calls, or for reporting irregularities to the IT team and management) is more successful than punishing simple and innocent errors.

A concept that may be useful here is the idea of being a High Reliability IT Organisation – where management understands that a mistake on a small scale can have a major impact on the entire organisation; and so eliminating the smaller threats such as human error is important for the greater good of the organisation.

How an organisation responds to a cyber incident is also essential. When an issue or incident arises, an organisation needs to be in front of the situation to mitigate any resulting damage as quickly as possible. Consequently, cyber risk and incident response should form a key component of an organisation's business continuity and disaster recovery plans, and organisations responsible for collecting and using personal information should ensure they also have effective procedures in place to respond following a data breach.

⁴ An article prepared by Local Government Professionals Australia in association with 2016-17 principal partner Jardine Lloyd Thompson, 10 March 2017.

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Organisations cannot afford to underestimate their varying exposures. The belief that cyber security and the associated risks are limited purely to someone hacking their networks from outside needs to change. Cyber risk is much more than merely the idea of an external hacker; organisations also need to consider the full gamut of other possible scenarios, including a mistake as simple as sending a mailing list in error, right through to a rogue employee deliberately instigating a programme error or creating a system backdoor in order to breach security. It is imperative organisations continually look outside the square and continually analyse their systems to reduce their exposure.

At present, the potential loss to organisations from 3rd party claims alleging purely a breach of privacy or loss of personal information is difficult to quantify – claims of this type have generally been unsuccessful in other jurisdictions due to the plaintiffs' inability to prove damages, except in cases where there has been a loss of credit card data. However the potential for significant reputational damage should always be in the forefront of management's thinking, and the potential for an investigation by a regulator such as the Office of the Australian Information Commissioner and the associated costs should not be overlooked, especially in light of the 2017 legislation establishing mandatory data breach notification requirements in Australia.

Establishing effective policies and procedures, building an information secure culture and having safe guards and mitigation strategies in place is fundamental in protecting an organisation's data and technology systems, as well as its reputation. It is important for organisations not to underestimate their increasing reliance on information technology; and to take proper account of their need for the ongoing availability of those systems and associated data for the organisation's continued operation.



8. Housing and construction

8.1 Changes in the regional distribution of wealth

Dwellings (including the land under dwellings) account for roughly two-thirds of household assets and financial assets for most of the remainder – other than farmland, the value of unincorporated businesses is mostly minor.

The analysis of household wealth demonstrates inequality between regions. The lowest wealth regions may lack the capacity to deal with change or improve productivity as industry and skills requirements change as a result of global influences. In regions where this is not the case, other reasons for the relative decline of household wealth typically include slow land value increases relative to elsewhere and/or high mortgages relative to property values. The rise in the number of apartments in inner cities also has an impact on reducing average household wealth as a consequence of smaller dwellings and the smaller number of occupants per household that result. The value of CBD and inner city knowledge economy clusters also has an impact on the distribution of household wealth. Local Government area boundary changes in New South Wales have also had an impact on the household wealth in Sydney given in SOR regions in this report.

Table 8.1 shows that the region with the highest average wealth per household in 2017 is Sydney Outer Northern Shores at \$1.95 million, increasing from \$1.77 million in 2016. The region with the lowest average wealth per household in 2017 is WA Gascoyne Goldfields with an average household wealth of \$304,000.

Table 8.1 Wealth per household – Top 10 high and low regions (2014-15 \$'000 prices)											
SOR name	2001	2006	2010	2011	2012	2013	2014	2015	2016	2017	
High regions											
Sydney Outer Northern Shores	1364	1562	1487	1469	1399	1462	1618	1760	1771	1953	
Melbourne Eastern Inner	910	1233	1499	1452	1350	1403	1510	1617	1741	1888	
Sydney Eastern Shores	1345	1574	1599	1557	1457	1526	1669	1795	1830	1773	
Melbourne Southern Inner	930	1196	1423	1355	1237	1250	1336	1369	1448	1463	
Sydney Metropolitan Core	1310	1448	1437	1403	1314	1383	1487	1644	1642	1389	
Sydney Near West	905	1043	1042	1077	1053	1072	1217	1382	1370	1379	
Sydney South East	883	1015	954	981	966	1004	1103	1245	1268	1373	
Sydney Parramatta Ryde	916	1033	993	1000	963	1004	1119	1273	1270	1285	
Melbourne Eastern Outer	503	724	831	832	776	798	833	875	967	1126	
Melbourne Northern Inner	547	716	910	900	830	836	866	895	940	996	
Low regions											
SA North	316	459	461	577	457	435	439	452	431	430	
SA East	320	440	415	515	391	409	450	375	384	429	
TAS North	320	522	487	497	451	439	436	429	428	424	
Adelaide North	295	433	473	539	445	437	435	438	437	423	
Perth Outer North	265	521	505	521	489	534	506	479	431	393	
QLD Townsville North West	320	500	523	523	488	475	456	431	405	386	
SA Far North and West	265	381	422	494	407	413	398	390	374	380	
Melbourne City	895	969	1092	1003	860	845	861	821	757	344	
WA Pilbara Kimberley	389	480	638	700	725	742	633	494	375	311	
WA Gascoyne Goldfields	254	418	400	443	414	440	427	378	313	304	
Australia	528	740	752	755	706	725	752	781	787	823	

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Australia's top ten regions ranked by average wealth and taking into account new LGA boundaries in Sydney are in Sydney and Melbourne. Six of these high wealth regions are in Sydney. Melbourne's highest ranked region for this indicator is Melbourne Eastern Inner with an average wealth per household in 2017 of \$1.89 million, rising from \$1.74 million in 2016. Melbourne City features at the lowest end of the scale with an average household wealth of \$344,000 as a result of the large student population now accommodated in Melbourne City and living in small apartments and as the general population of city apartment dwellers grows.

Table 8.3 shows that the greatest increases in household wealth in the period 2012 – 2017 occurred mostly in Sydney and relate to the increase in property prices. Melbourne regions grew more slowly partly because of the cyclical nature of land increases in different regions and the continuing development in its western suburbs. Residents of Melbourne's western suburbs are able to access CBD employment, Sydney does not really have the equivalent region that has such significant potential to expand, which in Melbourne's case is easing housing affordability issues.

In the period 2012 to 2017, the highest growth rates in household wealth among city regions were in Sydney Outer South West and Sydney Outer West, where household wealth grew at an average annual rate of 12.9 per cent and 12.7 per cent respectively. The highest growth in household wealth over the period in Melbourne occurred in Melbourne Eastern Outer and Melbourne Eastern Inner, where household wealth grew at an average annual rate of 7.7 per cent and 6.9 per cent respectively.

In the period 2012 to 2017, regional New South Wales had relatively strong growth in the household wealth indicator, particularly so when compared to non-city regions elsewhere in Australia. In NSW Central Coast household wealth grew at an average annual rate of 9.7 per cent, NSW Tablelands at 8.7 per cent, NSW Illawarra at 8.2 per cent and NSW Coastal Hunter at 7 per cent. In the non-Melbourne regions of Victoria household wealth grew more slowly and in the range of 3 to 4 per cent per annum, VIC South West grew the fastest at an average annual rate of 4.7 per cent in the period 2012 to 2017.

In the ACT, household wealth declined by -0.5 per cent per annum in the period.

For Queensland regions in the period 2012 to 2017 household wealth in SEQ Brisbane City declined by an average annual rate of -1.1 per cent per annum, results here likely to be a combination of the increasing number of apartments which has the effect of reducing household scale and lowering per unit property prices and the general economic circumstances for Queensland in the period. Household wealth also declined in QLD Townsville North West at -4.6 per cent per annum, in QLD Mackay at -3.8 per cent and QLD Central West at -3.2 per cent.

In the period 2012 to 2017, the story for household wealth in South Australia is similar to that in Queensland. The only South Australian regions not to experience small declines in household wealth were SA East, where household wealth increased by 1.9 per cent per annum and SA Fleurieu at 1.2 per cent per annum.

Declines in household wealth in the period 2012 to 2017 were greater in Western Australia as the impact of the mining investment construction boom faded and with it a softening of dwelling prices. Declines in household wealth were most evident in WA Pilbara Kimberley at -15.8 per cent, WA Gascoyne Goldfields at -6 per cent and in Perth were household wealth in its SOR regions declined at around 4 per cent per annum in the period. There were also declines in household wealth in both SOR regions of the Northern Territory of around 4 per cent per annum.

For Tasmania in the period 2012 to 2017, TAS North West household wealth grew by 2.3 per cent per annum and TAS Hobart South, household wealth grew by 1.7 per cent per annum, household wealth declined slightly in TAS North at -1.2 per cent per annum.



Table 8.2 Wealth per household (2014-15 \$'000 prices)										
SOR name	2001	2006	2010	2011	2012	2013	2014	2015	2016	2017
Sydney Metropolitan Core	1310	1448	1437	1403	1314	1383	1487	1644	1642	1389
Sydney Eastern Shores	1345	1574	1599	1557	1457	1526	1669	1795	1830	1773
Sydney Mid West	507	593	558	581	569	587	663	792	789	820
Sydney Near West	905	1043	1042	1077	1053	1072	1217	1382	1370	1379
Sydney Outer Northern Shores	1364	1562	1487	1469	1399	1462	1618	1760	1771	1953
Sydney Outer South West	397	488	418	425	418	438	497	608	617	759
Sydney Outer West	384	499	433	438	426	454	515	620	624	782
Sydney Parramatta Ryde	916	1033	993	1000	963	1004	1119	1273	1270	1285
Sydney South East	883	1015	954	981	966	1004	1103	1245	1268	1373
NSW Central Coast	529	666	573	565	544	570	618	697	717	865
NSW Central West	281	450	381	392	397	428	452	474	465	544
NSW Coastal Hunter	409	616	570	579	567	601	649	680	674	794
NSW Illawarra	445	634	565	584	576	601	631	711	730	854
NSW Inland Hunter	264	469	421	442	448	481	475	483	461	555
NSW Murray Far West	303	436	368	365	365	394	392	440	435	498
NSW Murrumbidgee	333	487	417	412	423	453	471	496	497	580
NSW North Coast	373	620	532	538	525	546	562	614	606	699
NSW Northern Inland	298	471	423	444	429	464	457	499	491	568
NSW Northern Rivers	364	641	604	593	554	573	596	643	639	739
NSW Orana	266	417	381	413	398	422	428	463	449	516
NSW Southern Tablelands	410	635	576	582	559	626	651	708	695	848
NSW South Coast	409	732	633	637	618	635	652	706	699	832
Melbourne City	895	969	1092	1003	860	845	861	821	757	344
Melbourne Eastern Inner	910	1233	1499	1452	1350	1403	1510	1617	1741	1888
Melbourne Eastern Outer	503	724	831	832	776	798	833	875	967	1126
Melbourne Northern Inner	547	716	910	900	830	836	866	895	940	996
Melbourne Northern Outer	377	515	605	602	552	547	540	551	566	676
Melbourne Southern Inner	930	1196	1423	1355	1237	1250	1336	1369	1448	1463
Melbourne Southern Outer	413	629	713	704	650	652	658	667	696	839
Melbourne Western	425	550	662	663	611	614	624	640	672	778
VIC Geelong	388	632	665	665	644	655	644	649	657	739
VIC Gippsland	291	562	556	575	552	555	562	555	559	635
VIC Grampians	306	478	477	485	478	491	482	482	480	555
VIC Hume	328	524	495	494	480	486	483	490	493	558
VIC Loddon Mallee	339	500	489	500	496	514	515	520	522	600
VIC South West	396	698	722	721	704	723	732	730	754	885
SEQ Brisbane City	652	945	997	978	915	921	929	925	923	865
SEQ Gold Coast	573	897	881	835	764	780	792	786	807	802
SEQ West Moreton	250	490	512	502	463	450	451	444	432	450
SEQ Logan Redland	323	554	588	565	516	506	503	494	491	517
SEQ Moreton Bay	347	569	592	574	521	524	525	523	523	537
SEQ Sunshine Coast	507	889	855	828	774	777	797	827	825	844

Table 8.2 Wealth per household (2014-15 \$'000 prices) – continued										
SOR name	2001	2006	2010	2011	2012	2013	2014	2015	2016	2017
QLD Darling Downs South West	322	519	482	480	467	489	480	461	461	475
QLD Far North Torres	355	555	542	536	502	518	495	489	498	506
QLD Fitzroy Central West	272	479	516	538	546	553	531	486	462	463
QLD Mackay	329	680	677	685	693	707	639	579	551	571
QLD Townsville North West	320	500	523	523	488	475	456	431	405	386
QLD Wide Bay Burnett	289	533	499	489	461	460	441	426	426	440
Adelaide South	531	737	773	872	699	698	700	701	698	663
Adelaide North	295	433	473	539	445	437	435	438	437	423
SA East	320	440	415	515	391	409	450	375	384	429
SA Far North and West	265	381	422	494	407	413	398	390	374	380
SA Fleurieu	441	688	687	800	633	648	640	638	652	673
SA North	316	459	461	577	457	435	439	452	431	430
Perth Central	577	997	1018	1023	938	982	984	921	856	779
Perth Outer North	265	521	505	521	489	534	506	479	431	393
Perth Outer South	285	566	548	572	539	577	567	524	481	444
WA Gascoyne Goldfields	254	418	400	443	414	440	427	378	313	304
WA Peel South West	289	641	549	569	541	572	546	507	481	463
WA Pilbara Kimberley	389	480	638	700	725	742	633	494	375	311
WA Wheatbelt Great Southern	352	588	497	538	548	559	549	542	502	502
TAS Hobart South	390	615	586	598	541	546	531	537	549	589
TAS North	320	522	487	497	451	439	436	429	428	424
TAS North West	301	429	427	437	386	426	389	381	401	433
NT Darwin	363	633	737	717	754	774	701	708	687	615
NT Lingiari	345	433	507	510	528	520	565	486	431	435
ACT	492	684	684	719	681	697	664	626	653	663
Australia	528	740	752	755	706	725	752	781	787	823

able 8.3 Wealth per household (2014-15 \$000 prices) – Average annual growth										
						Average ani	nual growth			
					2002 to	2007 to	2012 to	2002 to		
SOR name	2002	2007	2012	2017	2007	2012	2017	2017		
Sydney Metropolitan Core	1336	1605	1314	1389	3.7	-3.9	1.1	0.3		
Sydney Eastern Shores	1388	1788	1457	1773	5.2	-4.0	4.0	1.6		
Sydney Mid West	523	583	569	820	2.2	-0.5	7.6	3.0		
Sydney Near West	931	1095	1053	1379	3.3	-0.8	5.6	2.7		
Sydney Outer Northern Shores	1401	1716	1399	1953	4.1	-4.0	6.9	2.2		
Sydney Outer South West	413	486	418	759	3.3	-3.0	12.7	4.1		
Sydney Outer West	405	491	426	782	3.9	-2.8	12.9	4.5		
Sydney Parramatta Ryde	939	1093	963	1285	3.1	-2.5	5.9	2.1		
Sydney South East	908	1060	966	1373	3.1	-1.8	7.3	2.8		
NSW Central Coast	554	678	544	865	4.1	-4.3	9.7	3.0		
NSW Central West	308	456	397	544	8.1	-2.7	6.5	3.9		
NSW Coastal Hunter	444	651	567	794	8.0	-2.7	7.0	4.0		
NSW Illawarra	478	645	576	854	6.2	-2.2	8.2	3.9		
NSW Inland Hunter	296	490	448	555	10.6	-1.8	4.4	4.3		
NSW Murray Far West	326	463	365	498	7.3	-4.7	6.4	2.9		
NSW Murrumbidgee	359	497	423	580	6.7	-3.2	6.5	3.2		
NSW North Coast	413	630	525	699	8.8	-3.5	5.9	3.6		
NSW Northern Inland	327	491	429	568	8.5	-2.7	5.8	3.8		
NSW Northern Rivers	407	667	554	739	10.4	-3.6	5.9	4.1		
NSW Orana	291	421	398	516	7.7	-1.1	5.4	3.9		
NSW Southern Tablelands	448	664	559	848	8.2	-3.4	8.7	4.3		
NSW South Coast	460	742	618	832	10.0	-3.6	6.1	4.0		
Melbourne City	909	1114	860	344	4.1	-5.0	-16.7	-6.3		
Melbourne Eastern Inner	967	1421	1350	1888	8.0	-1.0	6.9	4.6		
Melbourne Eastern Outer	541	814	776	1126	8.5	-1.0	7.7	5.0		
Melbourne Northern Inner	577	810	830	996	7.0	0.5	3.7	3.7		
Melbourne Northern Outer	402	568	552	676	7.2	-0.6	4.1	3.5		
Melbourne Southern Inner	978	1382	1237	1463	7.2	-2.2	3.4	2.7		
Melbourne Southern Outer	449	699	650	839	9.2	-1.4	5.3	4.3		
Melbourne Western	447	604	611	778	6.2	0.2	5.0	3.8		
VIC Geelong	428	691	644	739	10.1	-1.4	2.8	3.7		
VIC Gippsland	332	601	552	635	12.6	-1.7	2.8	4.4		
VIC Grampians	334	509	478	555	8.8	-1.2	3.0	3.4		
VIC Hume	360	560	480	558	9.2	-3.0	3.0	3.0		
VIC Loddon Mallee	366	538	496	600	8.0	-1.6	3.9	3.3		
VIC South West	443	764	704	885	11.5	-1.6	4.7	4.7		
SEQ Brisbane City	702	1074	915	865	8.9	-3.2	-1.1	1.4		
SEQ Gold Coast	627	1022	764	802	10.3	-5.6	1.0	1.7		
SEQ West Moreton	286	544	463	450	13.7	-3.2	-0.6	3.1		
SEQ Logan Redland	360	632	516	517	11.9	-4.0	0.1	2.5		
SEQ Moreton Bay	383	645	521	537	11.0	-4.2	0.6	2.3		
SEQ Sunshine Coast	567	975	774	844	11.5	-4.5	1.8	2.7		

Table 8.3Wealth per household (20	14-15 \$00	00 prices)	– Average	e annual g	rowth (co	ntinued)		
						Average annual growth 2007 to 2012 2012 to 2017 2 -3.6 0.3 -5.0 0.2 -1.4 -3.2 -3.2 -3.8 -3.9 -4.6 -4.4 -0.9 -3.2 -1.1 -1.3 -1.0 -3.9 1.9 -3.7 1.2 -3.7 1.2 -3.7 -3.7 -4.0 -4.3 -3.7 -3.8 -2.8 -6.0 -5.1 -3.1 3.7 -15.6 -3.6 -1.7 -4.2 1.7 -4.3 -1.2 -3.7 -3.8 -2.8 -6.0 -5.1 -3.1 3.7 -15.6 -3.6 -1.7 -4.3 -1.2 -3.7 2.3 1.6 -4.0 2.8 -3.8 -2.0 -0.5 <th>I</th>		I
SOR name	2002	2007	2012	2017	2002 to 2007	2007 to 2012	2012 to 2017	2002 to 2017
QLD Darling Downs South West	355	560	467	475	9.6	-3.6	0.3	2.0
QLD Far North Torres	388	648	502	506	10.8	-5.0	0.2	1.8
QLD Fitzroy Central West	305	585	546	463	14.0	-1.4	-3.2	2.8
QLD Mackay	381	814	693	571	16.4	-3.2	-3.8	2.7
QLD Townsville North West	350	596	488	386	11.3	-3.9	-4.6	0.7
QLD Wide Bay Burnett	327	577	461	440	12.1	-4.4	-0.9	2.0
Adelaide South	567	822	699	663	7.7	-3.2	-1.1	1.0
Adelaide North	318	474	445	423	8.3	-1.3	-1.0	1.9
SA East	341	478	391	429	7.0	-3.9	1.9	1.6
SA Far North and West	285	435	407	380	8.8	-1.3	-1.4	1.9
SA Fleurieu	482	765	633	673	9.6	-3.7	1.2	2.2
SA North	340	509	457	430	8.4	-2.1	-1.2	1.6
Perth Central	644	1131	938	779	11.9	-3.7	-3.7	1.3
Perth Outer North	304	599	489	393	14.6	-4.0	-4.3	1.7
Perth Outer South	327	651	539	444	14.8	-3.7	-3.8	2.1
WA Gascoyne Goldfields	281	476	414	304	11.1	-2.8	-6.0	0.5
WA Peel South West	339	704	541	463	15.7	-5.1	-3.1	2.1
WA Pilbara Kimberley	406	603	725	311	8.2	3.7	-15.6	-1.8
WA Wheatbelt Great Southern	390	658	548	502	11.0	-3.6	-1.7	1.7
TAS Hobart South	427	670	541	589	9.4	-4.2	1.7	2.2
TAS North	353	563	451	424	9.8	-4.3	-1.2	1.2
TAS North West	323	467	386	433	7.6	-3.7	2.3	2.0
NT Darwin	405	697	754	615	11.4	1.6	-4.0	2.8
NT Lingiari	361	459	528	435	4.9	2.8	-3.8	1.2
ACT	526	754	681	663	7.5	-2.0	-0.5	1.6
Australia	565	814	706	823	7.6	-2.8	3.1	2.5

8.2 Household debt to gross income (less income tax) ratio

The debt to gross income ratio remains dangerously high in many of Australia's regions. Ratios remain the highest in urban regions with high levels of growth and increasing house prices as in the case of Sydney and Melbourne, however the trend is now a more general one and includes Western Australian and Queensland regions. The mortgage belts of the outer suburbs of Sydney, Melbourne and Perth are all areas where mortgages are very high in relation to incomes. Much of South East Queensland also fits this pattern.

Table 8.4 shows that the highest debt to gross income ratio regions in 2017 are Perth Outer North, SEQ Logan Redland, Melbourne Eastern Inner, Sydney Outer South West, Sydney Outer West and WA Peel South West, all of which have a ratio of 2 plus. In all these regions the debt to gross income ratio had risen when compared to the previous year.

Table 8.4 Household debt t	Table 8.4Household debt to gross income (less income tax) ratio – Top 10 high and low regions											
SOR name	2001	2006	2010	2011	2012	2013	2014	2015	2016	2017		
High regions												
Perth Outer North	1.65	2.05	1.93	1.83	1.79	1.77	1.83	1.91	2.08	2.29		
SEQ Logan Redland	1.49	1.71	1.76	1.73	1.77	1.80	1.83	1.90	1.99	2.18		
Melbourne Eastern Inner	0.87	1.33	1.78	1.69	1.64	1.64	1.79	1.99	2.07	2.13		
Sydney Outer South West	1.52	1.91	1.81	1.79	1.83	1.85	1.78	1.80	1.89	2.09		
Sydney Outer West	1.65	1.89	1.80	1.78	1.81	1.81	1.76	1.78	1.87	2.09		
WA Peel South West	1.28	1.72	1.65	1.59	1.55	1.54	1.58	1.65	1.83	2.06		
Melbourne Eastern Outer	1.42	1.60	1.67	1.62	1.65	1.64	1.71	1.79	1.87	1.99		
SEQ Moreton Bay	1.43	1.75	1.78	1.71	1.71	1.73	1.72	1.74	1.85	1.98		
Melbourne Southern Outer	1.44	1.65	1.71	1.71	1.79	1.81	1.80	1.83	1.82	1.97		
SEQ West Moreton	1.61	1.58	1.65	1.61	1.63	1.62	1.63	1.68	1.73	1.94		
Low regions												
NSW Murray Far West	1.24	1.21	1.28	1.41	1.34	1.33	1.31	1.20	1.23	1.22		
SA East	0.92	1.05	1.03	1.08	1.15	1.15	1.17	1.19	1.23	1.21		
Melbourne City	0.55	1.10	1.52	1.81	1.91	2.09	2.17	2.37	2.42	1.21		
SA Far North and West	0.84	1.00	1.06	1.13	1.14	1.17	1.17	1.11	1.11	1.19		
TAS North West	0.96	0.92	1.03	1.06	1.07	1.11	1.11	1.10	1.15	1.19		
NSW Orana	1.27	1.15	1.14	1.13	1.23	1.27	1.26	1.15	1.14	1.17		
NSW Murrumbidgee	1.24	1.21	1.25	1.33	1.28	1.25	1.17	1.11	1.11	1.12		
VIC South West	1.17	1.19	1.11	1.16	1.21	1.21	1.16	1.17	1.15	1.11		
АСТ	0.77	0.89	0.90	0.88	0.85	0.83	0.91	0.97	1.01	1.03		
NT Lingiari	0.78	0.82	0.77	0.82	0.84	0.83	0.99	0.93	0.79	0.79		
Australia	1.13	1.47	1.53	1.52	1.52	1.53	1.55	1.61	1.67	1.72		

Table 8.5 Household debt to gross income (less income tax) ratio										
SOR name	2001	2006	2010	2011	2012	2013	2014	2015	2016	2017
Sydney Metropolitan Core	0.68	1.29	1.53	1.62	1.61	1.66	1.76	1.90	1.98	1.47
Sydney Eastern Shores	0.75	1.33	1.48	1.46	1.40	1.41	1.45	1.59	1.71	1.52
Sydney Mid West	1.24	1.68	1.64	1.68	1.68	1.70	1.70	1.80	1.85	1.84
Sydney Near West	1.01	1.52	1.68	1.70	1.66	1.66	1.69	1.83	1.87	1.81
Sydney Outer Northern Shores	0.85	1.51	1.55	1.46	1.41	1.42	1.44	1.57	1.64	1.84
Sydney Outer South West	1.52	1.91	1.81	1.79	1.83	1.85	1.78	1.80	1.89	2.09
Sydney Outer West	1.65	1.89	1.80	1.78	1.81	1.81	1.76	1.78	1.87	2.09
Sydney Parramatta Ryde	1.01	1.56	1.68	1.63	1.61	1.63	1.70	1.82	1.90	1.89
Sydney South East	1.16	1.70	1.71	1.64	1.61	1.59	1.60	1.69	1.75	1.83
NSW Central Coast	1.20	1.69	1.55	1.50	1.46	1.46	1.42	1.48	1.49	1.72
NSW Central West	1.37	1.29	1.29	1.37	1.40	1.43	1.33	1.27	1.25	1.35
NSW Coastal Hunter	1.15	1.49	1.49	1.45	1.43	1.44	1.38	1.35	1.35	1.52
NSW Illawarra	1.24	1.57	1.55	1.52	1.49	1.45	1.36	1.38	1.42	1.60
NSW Inland Hunter	1.44	1.50	1.53	1.51	1.52	1.57	1.48	1.43	1.40	1.53
NSW Murray Far West	1.24	1.21	1.28	1.41	1.34	1.33	1.31	1.20	1.23	1.22
NSW Murrumbidgee	1.24	1.21	1.25	1.33	1.28	1.25	1.17	1.11	1.11	1.12
NSW North Coast	1.16	1.39	1.50	1.46	1.44	1.44	1.37	1.30	1.34	1.53
NSW Northern Inland	1.23	1.14	1.26	1.23	1.31	1.37	1.30	1.23	1.19	1.23
NSW Northern Rivers	1.18	1.40	1.67	1.67	1.59	1.60	1.53	1.52	1.50	1.75
NSW Orana	1.27	1.15	1.14	1.13	1.23	1.27	1.26	1.15	1.14	1.17
NSW Southern Tablelands	1.38	1.50	1.55	1.55	1.56	1.68	1.61	1.54	1.54	1.77
NSW South Coast	1.08	1.37	1.40	1.33	1.32	1.36	1.31	1.31	1.35	1.75
Melbourne City	0.55	1.10	1.52	1.81	1.91	2.09	2.17	2.37	2.42	1.21
Melbourne Eastern Inner	0.87	1.33	1.78	1.69	1.64	1.64	1.79	1.99	2.07	2.13
Melbourne Eastern Outer	1.42	1.60	1.67	1.62	1.65	1.64	1.71	1.79	1.87	1.99
Melbourne Northern Inner	1.03	1.42	1.65	1.71	1.69	1.69	1.74	1.81	1.86	1.82
Melbourne Northern Outer	1.49	1.68	1.63	1.69	1.73	1.72	1.69	1.70	1.66	1.75
Melbourne Southern Inner	0.77	1.31	1.64	1.61	1.57	1.58	1.63	1.78	1.87	1.78
Melbourne Southern Outer	1.44	1.65	1.71	1.71	1.79	1.81	1.80	1.83	1.82	1.97
Melbourne Western	1.23	1.57	1.67	1.76	1.81	1.80	1.79	1.81	1.81	1.91
VIC Geelong	1.14	1.41	1.41	1.47	1.55	1.59	1.62	1.65	1.57	1.63
VIC Gippsland	1.24	1.26	1.19	1.24	1.31	1.38	1.35	1.31	1.29	1.31
VIC Grampians	1.24	1.29	1.21	1.29	1.35	1.36	1.40	1.42	1.40	1.37
VIC Hume	1.30	1.33	1.24	1.32	1.36	1.37	1.36	1.33	1.29	1.32
VIC Loddon Mallee	1.22	1.26	1.20	1.30	1.34	1.37	1.38	1.39	1.37	1.31
VIC South West	1.17	1.19	1.11	1.16	1.21	1.21	1.16	1.17	1.15	1.11
SEQ Brisbane City	0.90	1.39	1.44	1.43	1.43	1.47	1.52	1.60	1.71	1.72
SEQ Gold Coast	0.95	1.59	1.60	1.58	1.55	1.56	1.60	1.66	1.78	1.90
SEQ West Moreton	1.61	1.58	1.65	1.61	1.63	1.62	1.63	1.68	1.73	1.94
SEQ Logan Redland	1.49	1.71	1.76	1.73	1.77	1.80	1.83	1.90	1.99	2.18
SEQ Moreton Bay	1.43	1.75	1.78	1.71	1.71	1.73	1.72	1.74	1.85	1.98
SEQ Sunshine Coast	0.98	1.57	1.56	1.49	1.43	1.44	1.46	1.53	1.65	1.85

Table 8.5 Household debt to gross income (less income tax) ratio – continued											
SOR name	2001	2006	2010	2011	2012	2013	2014	2015	2016	2017	
QLD Darling Downs South West	1.03	1.19	1.39	1.42	1.42	1.49	1.55	1.59	1.61	1.63	
QLD Far North Torres	1.20	1.30	1.44	1.52	1.52	1.54	1.64	1.68	1.75	1.77	
QLD Fitzroy Central West	1.20	1.28	1.51	1.53	1.59	1.64	1.58	1.53	1.50	1.55	
QLD Mackay	1.15	1.28	1.33	1.32	1.38	1.39	1.39	1.34	1.28	1.27	
QLD Townsville North West	1.12	1.29	1.49	1.48	1.56	1.62	1.62	1.61	1.69	1.72	
QLD Wide Bay Burnett	1.23	1.37	1.58	1.56	1.61	1.63	1.69	1.74	1.76	1.90	
Adelaide South	0.94	1.31	1.42	1.43	1.43	1.46	1.48	1.53	1.61	1.71	
Adelaide North	1.20	1.43	1.52	1.50	1.50	1.50	1.48	1.49	1.59	1.73	
SA East	0.92	1.05	1.03	1.08	1.15	1.15	1.17	1.19	1.23	1.21	
SA Far North and West	0.84	1.00	1.06	1.13	1.14	1.17	1.17	1.11	1.11	1.19	
SA Fleurieu	1.10	1.32	1.37	1.35	1.35	1.37	1.37	1.37	1.45	1.58	
SA North	0.92	1.15	1.20	1.22	1.28	1.27	1.24	1.24	1.30	1.37	
Perth Central	1.07	1.70	1.60	1.52	1.46	1.50	1.55	1.61	1.70	1.74	
Perth Outer North	1.65	2.05	1.93	1.83	1.79	1.77	1.83	1.91	2.08	2.29	
Perth Outer South	1.58	1.97	1.73	1.61	1.55	1.55	1.60	1.66	1.76	1.89	
WA Gascoyne Goldfields	1.46	1.51	1.72	1.61	1.68	1.65	1.60	1.66	1.71	1.78	
WA Peel South West	1.28	1.72	1.65	1.59	1.55	1.54	1.58	1.65	1.83	2.06	
WA Pilbara Kimberley	1.25	1.44	1.58	1.57	1.62	1.62	1.57	1.50	1.45	1.43	
WA Wheatbelt Great Southern	1.24	1.26	1.50	1.48	1.35	1.27	1.26	1.28	1.39	1.44	
TAS Hobart South	1.00	1.07	1.16	1.19	1.21	1.25	1.26	1.27	1.35	1.46	
TAS North	0.99	0.99	1.06	1.11	1.14	1.17	1.15	1.17	1.23	1.26	
TAS North West	0.96	0.92	1.03	1.06	1.07	1.11	1.11	1.10	1.15	1.19	
NT Darwin	0.97	1.17	1.24	1.23	1.26	1.30	1.23	1.28	1.37	1.41	
NT Lingiari	0.78	0.82	0.77	0.82	0.84	0.83	0.99	0.93	0.79	0.79	
АСТ	0.77	0.89	0.90	0.88	0.85	0.83	0.91	0.97	1.01	1.03	
Australia	1.13	1.47	1.53	1.52	1.52	1.53	1.55	1.61	1.67	1.72	

Table 8.6 shows that the greatest change to the debt to gross income ratio in the period 2002 to 2017 has occurred in Melbourne Eastern Inner, Melbourne Southern Inner, Sydney Northern Shores and SEQ Gold Coast. With the exception of Adelaide South the ten regions experiencing the greatest change, that is higher levels of debt to gross income, are in Melbourne, Sydney and South East Queensland. Typically the debt to gross income ratio is most stable in rural regions including regions in New South Wales and Victoria, which had a relatively stable debt to gross income ratio in the period 2002 to 2017.

The concern is that households in the most stressed regions, because of high levels of debt in relation to income, have less money to spend in the local economy with an increasing share of income directed at the repayment of existing debt. All this at a time when interest rates are at record lows, we can be certain that interest rates will rise and when they do the impact on household disposable income in many regions will be significant and this impact flows into regional economies and local service industries.

It is worth noting that for Australia in 2001 the average debt to gross income ratio was 1.1 per cent, by 2017 it had reached 1.72 per cent with the highest average ratio in a region now at 2.29.

Table 8.6Household debt to gross in	Table 8.6 Household debt to gross income (less income tax) ratio – Top 10 high and low change regions											
						Cha	nge					
SOR name	2002	2007	2012	2017	2002 to 2007	2007 to 2012	2012 to 2017	2002 to 2017				
High growth regions												
Melbourne Eastern Inner	0.94	1.47	1.64	2.13	0.53	0.17	0.50	1.19				
Melbourne Southern Inner	0.86	1.41	1.57	1.78	0.56	0.16	0.21	0.93				
Sydney Outer Northern Shores	0.96	1.53	1.41	1.84	0.57	-0.11	0.42	0.88				
SEQ Gold Coast	1.06	1.56	1.55	1.90	0.51	-0.01	0.35	0.84				
Sydney Parramatta Ryde	1.10	1.61	1.61	1.89	0.50	0.00	0.28	0.78				
SEQ Sunshine Coast	1.08	1.52	1.43	1.85	0.44	-0.08	0.42	0.78				
SEQ Brisbane City	0.98	1.35	1.43	1.72	0.36	0.09	0.29	0.74				
Melbourne Northern Inner	1.10	1.45	1.69	1.82	0.35	0.24	0.13	0.72				
Sydney Near West	1.10	1.56	1.66	1.81	0.46	0.11	0.15	0.72				
Adelaide South	1.00	1.34	1.43	1.71	0.34	0.09	0.28	0.70				
Low growth regions												
VIC Loddon Mallee	1.23	1.26	1.34	1.31	0.03	0.08	-0.03	0.08				
VIC Gippsland	1.25	1.25	1.31	1.31	0.01	0.05	0.01	0.07				
NSW Northern Inland	1.21	1.24	1.31	1.23	0.03	0.07	-0.08	0.02				
VIC Hume	1.30	1.31	1.36	1.32	0.01	0.04	-0.04	0.01				
NT Lingiari	0.79	0.80	0.84	0.79	0.01	0.04	-0.05	0.00				
NSW Central West	1.36	1.36	1.40	1.35	0.00	0.04	-0.04	0.00				
NSW Murray Far West	1.23	1.29	1.34	1.22	0.06	0.05	-0.12	-0.01				
VIC South West	1.18	1.16	1.21	1.11	-0.01	0.04	-0.09	-0.06				
NSW Orana	1.25	1.26	1.23	1.17	0.01	-0.03	-0.06	-0.08				
NSW Murrumbidgee	1.23	1.24	1.28	1.12	0.00	0.05	-0.16	-0.11				
Australia	1.19	1.48	1.52	1.72	0.29	0.04	0.20	0.53				

8.3 The debt service ratio and mortgage burden on average dwelling prices

Not unexpectedly the debt service ratio is typically higher in metropolitan areas than it is in the rural regions. Table 8.7 shows that in 2017 the mortgage burden as measured by the ratio of average dwelling prices to average incomes is highest in in Perth Outer North, Melbourne Eastern Inner, SEQ Logan Redland, Sydney Outer South West and Sydney Outer West. All these regions report debt service ratios over 20 per cent, the highest currently 23.4 per cent. Debt service ratios in the top ten highest regions have increased, most but slightly, in all of these regions. In Perth Outer North the debt service ratio increased from 21.9 per cent in 2016 to 23.4 per cent in 2017.

The regions with the lowest debt service ratios continue to be NT Lingiari and the ACT. These low debt service ratios go a long way towards explaining the high levels of household disposable income in these regions. The debt service ratio in the ACT at 10.8 per cent is approximately half of that experienced in the Sydney regions.

Table 8.9 shows that in the period 2002 to 2017 the greatest increase in the mortgage burden as measured by the ratio of average dwelling prices to average incomes has occurred in Melbourne Eastern Inner, Melbourne City, Melbourne Southern Inner, Sydney Metropolitan Core and Sydney Northern Outer Beaches. Least pressure from mortgages on households has occurred in regional areas such as NSW Murrumbidgee, NSW Orana and VIC South West.

In 2001 the average ratio for Australia	was 13, in 2017 it was 18.
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Table 8.7 Household debt s	Table 8.7 Household debt service ratio – Top 10 high and low regions											
SOR name	2001	2006	2010	2011	2012	2013	2014	2015	2016	2017		
High regions												
Perth Outer North	19.3	24.3	22.9	22.7	22.0	20.4	20.0	20.3	21.9	23.4		
Melbourne Eastern Inner	10.2	15.7	21.0	20.9	20.0	18.8	19.5	21.0	21.8	21.9		
SEQ Logan Redland	17.5	20.1	20.8	21.4	21.6	20.6	19.9	20.1	20.8	21.9		
Sydney Outer South West	17.8	22.5	21.4	22.2	22.3	21.2	19.3	19.1	19.8	20.9		
Sydney Outer West	19.3	22.3	21.2	21.9	22.1	20.8	19.1	18.8	19.5	20.9		
Melbourne Eastern Outer	16.7	18.8	19.8	20.0	20.1	18.8	18.5	19.0	19.6	20.2		
SEQ Moreton Bay	16.8	20.6	21.0	21.1	21.0	19.9	18.7	18.4	19.3	20.1		
WA Peel South West	15.0	19.0	18.4	18.4	17.8	16.7	16.2	16.5	18.2	19.9		
Sydney Parramatta Ryde	11.9	18.3	19.8	20.1	19.7	18.7	18.4	19.2	19.9	19.8		
Melbourne Southern Outer	17.0	19.4	20.2	21.1	21.9	20.8	19.5	19.3	19.0	19.7		
Low regions												
NSW Northern Inland	14.4	13.5	14.8	15.2	16.0	15.7	14.1	13.0	12.5	12.6		
NSW Murray Far West	14.5	14.2	15.1	17.5	16.4	15.2	14.2	12.7	12.8	12.6		
SA East	10.8	12.3	12.2	13.4	14.1	13.2	12.8	12.6	12.8	12.4		
TAS North West	11.3	10.8	12.2	13.1	13.1	12.7	12.1	11.7	12.1	12.3		
SA Far North and West	9.8	11.8	12.5	14.0	13.9	13.5	12.6	11.7	11.6	12.1		
NSW Orana	14.9	13.6	13.5	13.9	15.0	14.5	13.7	12.1	11.9	11.9		
NSW Murrumbidgee	14.6	14.2	14.8	16.4	15.7	14.4	12.8	11.7	11.6	11.5		
VIC South West	13.8	14.0	13.1	14.3	14.7	13.9	12.6	12.4	12.0	11.3		
АСТ	9.0	10.5	10.6	10.8	10.4	9.5	9.8	10.3	10.5	10.6		
NT Lingiari	9.1	9.7	9.1	10.2	10.3	9.7	11.5	10.8	8.7	8.4		
Australia	13.3	17.3	18.1	18.8	18.6	17.6	16.9	17.0	17.4	17.7		

Table 8.8 Household debt service ratio (per cent)										
SOR name	2001	2006	2010	2011	2012	2013	2014	2015	2016	2017
Sydney Metropolitan Core	8	15	18	20	20	19	19	20	21	17
Sydney Eastern Shores	9	16	18	18	17	16	16	17	18	16
Sydney Mid West	14	20	19	21	21	19	19	19	19	19
Sydney Near West	12	18	20	21	20	19	18	19	20	19
Sydney Outer Northern Shores	10	18	18	18	17	16	16	17	17	18
Sydney Outer South West	18	22	21	22	22	21	19	19	20	21
Sydney Outer West	19	22	21	22	22	21	19	19	20	21
Sydney Parramatta Ryde	12	18	20	20	20	19	18	19	20	20
Sydney South East	14	20	20	20	20	18	17	18	18	19
NSW Central Coast	14	20	18	19	18	17	15	16	16	17
NSW Central West	16	15	15	17	17	16	14	13	13	14
NSW Coastal Hunter	13	18	18	18	17	17	15	14	14	15
NSW Illawarra	14	19	18	19	18	17	15	15	15	16
NSW Inland Hunter	17	18	18	19	19	18	16	15	15	16
NSW Murray Far West	14	14	15	17	16	15	14	13	13	13
NSW Murrumbidgee	15	14	15	16	16	14	13	12	12	11
NSW North Coast	14	16	18	18	18	17	15	14	14	15
NSW Northern Inland	14	13	15	15	16	16	14	13	12	13
NSW Northern Rivers	14	17	20	21	19	18	17	16	16	17
NSW Orana	15	14	14	14	15	14	14	12	12	12
NSW Southern Tablelands	16	18	18	19	19	19	17	16	16	18
NSW South Coast	13	16	16	16	16	16	14	14	14	17
Melbourne City	6	13	18	23	24	24	24	25	25	17
Melbourne Eastern Inner	10	16	21	21	20	19	19	21	22	22
Melbourne Eastern Outer	17	19	20	20	20	19	19	19	20	20
Melbourne Northern Inner	12	17	19	21	21	19	19	19	19	19
Melbourne Northern Outer	18	20	19	21	21	20	18	18	17	18
Melbourne Southern Inner	9	15	19	20	19	18	18	19	19	19
Melbourne Southern Outer	17	19	20	21	22	21	19	19	19	20
Melbourne Western	14	18	20	22	22	21	19	19	19	19
VIC Geelong	13	17	17	18	19	18	18	17	16	16
VIC Gippsland	15	15	14	15	16	16	15	14	14	13
VIC Grampians	15	15	14	16	17	16	15	15	15	14
VIC Hume	15	16	15	16	17	16	15	14	14	13
VIC Loddon Mallee	14	15	14	16	16	16	15	15	14	13
VIC South West	14	14	13	14	15	14	13	12	12	11
SEQ Brisbane City	11	16	17	18	18	17	17	17	18	18
SEQ Gold Coast	11	19	19	19	19	18	17	18	19	19
SEQ West Moreton	19	19	19	20	20	19	18	18	18	20
SEQ Logan Redland	18	20	21	21	22	21	20	20	21	22
SEQ Moreton Bay	17	21	21	21	21	20	19	18	19	20
SEQ Sunshine Coast	11	19	18	18	18	17	16	16	17	19

Table 8.8 Household debt service ratio (per cent) – continued										
SOR name	2001	2006	2010	2011	2012	2013	2014	2015	2016	2017
QLD Darling Downs South West	12	14	16	18	17	17	17	17	17	17
QLD Far North Torres	14	15	17	19	19	18	18	18	18	18
QLD Fitzroy Central West	14	15	18	19	19	19	17	16	16	16
QLD Mackay	14	15	16	16	17	16	15	14	14	13
QLD Townsville North West	13	15	18	18	19	19	18	17	18	18
QLD Wide Bay Burnett	14	16	19	19	20	19	18	18	18	19
Adelaide South	11	15	17	18	17	17	16	16	17	18
Adelaide North	14	17	18	18	18	17	16	16	17	18
SA East	11	12	12	13	14	13	13	13	13	12
SA Far North and West	10	12	13	14	14	13	13	12	12	12
SA Fleurieu	13	16	16	17	16	16	15	14	15	16
SA North	11	14	14	15	16	15	13	13	14	14
Perth Central	13	20	19	19	18	17	17	17	18	18
Perth Outer North	19	24	23	23	22	20	20	20	22	23
Perth Outer South	19	23	21	20	19	18	17	18	19	19
WA Gascoyne Goldfields	17	18	20	20	21	19	18	18	19	19
WA Peel South West	15	19	18	18	18	17	16	17	18	20
WA Pilbara Kimberley	15	17	19	20	20	19	17	16	15	15
WA Wheatbelt Great Southern	15	15	18	18	17	15	14	14	15	15
TAS Hobart South	12	13	14	15	15	14	14	13	14	15
TAS North	12	12	13	14	14	13	13	12	13	13
TAS North West	11	11	12	13	13	13	12	12	12	12
NT Darwin	11	14	15	15	15	15	13	13	14	14
NT Lingiari	9	10	9	10	10	10	12	11	9	8
ACT	9	10	11	11	10	10	10	10	11	11
Australia	13	17	18	19	19	18	17	17	17	18

Table 8.9 Household debt service ratio – change: Top 10 high and low regions									
					Change				
SOR name	2002	2007	2012	2017	2002 to 2007	2007 to 2012	2012 to 2017	2002 to 2017	
High growth regions									
Melbourne Eastern Inner	11.1	18.1	20.0	21.9	7.1	1.8	2.0	10.9	
Melbourne City	7.4	15.8	23.6	16.5	8.4	7.8	-7.0	9.1	
Melbourne Southern Inner	10.1	17.4	19.2	18.7	7.4	1.8	-0.5	8.7	
Sydney Metropolitan Core	9.1	16.9	19.7	17.0	7.8	2.8	-2.7	7.9	
Sydney Outer Northern Shores	11.2	18.9	17.3	18.5	7.6	-1.6	1.2	7.2	
SEQ Gold Coast	12.4	19.3	18.9	19.4	6.9	-0.4	0.4	7.0	
Sydney Parramatta Ryde	13.0	19.8	19.7	19.8	6.9	-0.2	0.1	6.8	
Sydney Eastern Shores	9.9	16.7	17.1	16.4	6.9	0.4	-0.7	6.5	
SEQ Brisbane City	11.6	16.6	17.5	18.0	5.1	0.9	0.5	6.4	
Sydney Near West	12.9	19.2	20.3	19.1	6.4	1.1	-1.2	6.3	
Low growth regions									
VIC Loddon Mallee	14.4	15.5	16.3	13.4	1.1	0.8	-2.9	-1.0	
VIC Gippsland	14.7	15.5	15.9	13.4	0.8	0.4	-2.6	-1.3	
NSW Inland Hunter	17.1	18.8	18.6	15.5	1.7	-0.2	-3.1	-1.6	
NSW Northern Inland	14.2	15.3	16.0	12.6	1.1	0.7	-3.5	-1.6	
VIC Hume	15.3	16.2	16.6	13.5	0.9	0.3	-3.1	-1.8	
NSW Murray Far West	14.4	16.0	16.4	12.6	1.5	0.4	-3.8	-1.9	
NSW Central West	15.9	16.8	17.1	13.7	0.9	0.3	-3.4	-2.2	
VIC South West	13.8	14.4	14.7	11.3	0.5	0.4	-3.5	-2.5	
NSW Orana	14.6	15.6	15.0	11.9	0.9	-0.6	-3.1	-2.7	
NSW Murrumbidgee	14.5	15.3	15.7	11.5	0.8	0.4	-4.2	-3.0	
Australia	14.0	18.3	18.6	17.7	4.3	0.3	-0.9	3.7	
9. Energy⁵

The *State of the Regions* report for 2007-08 included an extensive discussion of climate change and its implications for Australia's diverse regions. Updates have been provided in subsequent reports and this chapter provides a further update, with a particular focus on gas and electricity. Energy policy is a critical factor in determining competitiveness and productivity of Australia's industry sectors and in all its regions.

The mining sector, which has been driving the Australian economy, is changing from an investment in projects phase to a phase where production is dominant. This change is increasing the sector's demand for production energy (transport of materials and products, equipment operation and processing energy such as for LNG). Industrial energy demand is also increasing for agricultural product transport and processing as domestic and export of these products increases.

Domestically, besides export performance, population and household formation are driving growth in energy demands. Household formation is increasing at about 2 per cent per year (with regional variations) and this drives residential and, to a large extent, commercial energy demands. Each new household requires heating, cooling and appliance energy (for refrigeration, washing, etc.), plus transport and energy incorporated into clothing, food, health services and other consumption demands. These demands for energy services can sometimes be met by increases in energy efficiency but are also significant drivers of increases in demand for energy, including fuels and demand for energy capture through renewables.

9.1 International update

In 2016 United States electricity generation from gas increased so that it is now higher than that from coal. This trend continues. Ninety-four United States coal generation stations closed in 2015 and another 41 are likely to close by 2017. The main causes for the trend are low shale gas prices, growth in renewables and lower demand growth.

China plans to triple its solar capacity to reach 143 GW by 2020 (total global capacity of 181 GW in 2014). India proposes to install renewable capacity to 175 GW by 2022.

International negotiations over greenhouse gas emissions continue. At COP22, held in Marrakesh in November 2016, 48 under-developed countries committed to supplying their entire energy needs from renewables by 2050. Overall, COP22 confirmed the commitments made in Paris at COP21 commitments and advanced reviews and action pledges to meet the COP21 Agreement. COP22 did not, overall, view the Trump presidency as hindering positive global action on climate change, though it raised concerns over potential United States policy reversals such as pulling out of the Paris Agreement and freezing increases in appliance and equipment standards.

The Global Covenant of Mayors, chaired by Michael Bloomberg of New York, USA (a publisher), has a membership of about 7,000 towns and cities from 119 countries. The organisation has undertaken to promote best practice for reducing emissions and protecting against potential threats to members' environments. Membership accounts for about 8 per cent of global population and about 70 per cent of energy-related GHG emissions. The Trump impact on the COP21 Agreement is negative but it remains to be seen how strongly US industry and the states will go in an opposite direction when it comes to energy policy. Here is the current situation on writing this report.

⁵ Paper prepared by Graham Armstrong as senior associate of National Institute of Economic and Industry Research in association with Saturn Corporate Resources, *Energy Working Party and Stakeholder Group – Energy update*, March 2017.

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On 1 June 2017, US President Trump announced the United States (US) would withdraw from the December 2015 Paris Accord, citing economic impacts on the US economy (no mention of climate change impacts on the US economy and employment in renewables and energy efficiency improvements). This US move was criticised, or at least termed unfortunate, by virtually every world government, including China, France, Germany, and by most corporate interests in the United States; by several US states and US cities. Trump said the US would attempt to renegotiate the Paris Accord but no country showed any interest in this. A group of US states, including California (number 7 global economy) and New York, major US cities and Bloomberg (donated \$15 million for the effort), would form a coalition to retain and achieve the Paris Accord US target in their jurisdiction. Federal tax credits for renewables were extended for three years by Congress in 2016. Ironically three more coal-fired power stations closed on 31 May 2017 and gas prices were near record lows. And Elon Musk (Tesla) resigned from a presidential advisory council.

9.2 Australian developments

9.2.1 Australian Federal review of climate change policy

On 5 December 2016 the Federal Government announced a review of climate change policy that would attempt to balance energy security and affordability against Australia's Paris 2016 commitments. A discussion paper was released in March 2017 and submissions requested by 5 May 2017.

The discussion paper looks at opportunities for reducing emissions on a sector by sector basis, and provides an assessment of the Emissions Reduction Fund and a potential long-term emissions reduction goal post-2030. Minister Frydenburg, in announcing the review, claimed the current government's climate change policies are working in contrast to the previous government's carbon tax (which only lasted two years, which is not enough time to have a significant impact).

The Australian Energy Council, which represents 21 electricity and gas producers, said the Finkel review of energy security must be used in conjunction with the climate review to overhaul national energy systems as it transitions towards a greater share of intermittent renewable energy.

Terms of reference for the Review are as follows

- The opportunities and challenges of reducing emissions on a sector by sector basis.
- The impact of policies on jobs, investment, trade competitiveness, households and regional Australia.
- The integration of climate change and energy policy including the impact of state-based policies on achieving and effective national approach.
- The role and operation of the Emissions Reduction Fund (ERF) and its safeguard mechanism.
- The potential role of credible international permits in meeting emission targets.
- A potential long-term emissions reduction goal post-2030.

9.2.2 National Greenhouse Reporting System (NGERS), Department of Energy & Environment 2015-16 report, 22 December 2016

This report indicates Australian GHG emissions rose by 0.8 per cent in 2015-16, the increase mainly coming from electricity generation and new LNG projects. Per capita emissions fell to 23t CO_2e , down from 26t CO_2e ten years ago.

Emissions may not exceed the target of a 5 per cent reduction of 2000 levels by 2020 but remain unlikely to meet the Paris Agreement target of 26 to 28 per cent below 2005 levels by 2030. National emissions in 2030 are projected to be 592 million tonnes (Mt) in 2030 against a 2030 target of about 450 Mt. Although emission projections are uncertain and do not include impacts of such policies as the National Energy Productivity Plan (a 40 per cent energy productivity improvement over 2005 to 2030), the Government's rejection of any form of carbon pricing in its 2017 climate change policy review make it extremely unlikely the 2030 target will be achieved.

Although the energy sector (stationary, mobile and fugitive) emissions account for over 60 per cent of national GHG emissions, some analysts and observers speculate that the 2030 target could be attained by moderate action in the energy sector and an aggressive approach to other emission sources, particularly agricultural and forestry sector emissions. We doubt the effectiveness of relying on this approach due to:

- the magnitude of the target achievement task; and
- the uncertainty surrounding means of reducing non-energy emissions, means of measuring them and the genuiness and permanence of these GHG reduction sources.

9.2.3 Victoria's emissions target

A reduction in Victoria's GHG emissions of 15 to 20 per cent by 2020 would be underpinned by closure of the greenhouse gas intensive Hazelwood brown coal generator, which accounted for 13 per cent of State emissions in its last full year of operation. But other cuts will be necessary via energy efficiency and renewable energy initiatives. Following the Hazelwood closure GHG emissions from other Victorian generators could increase by up to 5 per cent; the Loy Yang B generator is being refurbished to increase efficiency and output which is likely to cause a net increase in emissions by about 4 per cent.

The Victorian Renewable Energy Target is 25 per cent of electricity supply by 2020 and 40 per cent by 2040, increasing from 14 per cent in 2016.

Other initiatives include:

- a target for State agencies of a 30 per cent cut in emissions from 2015 levels by 2020; and
- State joining of the global Under 2 Coalition of sub-national governments aiming to avoid 2°C global warming.

9.3 Photovoltaics: fuel cycle emissions analysis

Solar cells require significant amounts of energy for their production. The emissions associated with this energy depend on where and when the cells were made. For example, emissions are higher per watt of PV capacity manufactured in China compared with Europe. Embodied emissions per watt have been declining because of improvements in production and generator efficiency. The type of cell is also important. Most are based on silicon and use production energy to melt the silicon at 1414°C. Melting silicon in electric furnaces generates depending on the greenhouse gas intensity of

the electricity used. Energy is also used in the assembly of cell arrays to produce PV electricity. Once the arrays are installed and the cells are producing electricity, emissions are saved depending on the greenhouse gas intensity of the electricity displaced by the PV array.

Wilfried van-Sark, et al, from Utrecht University, the Netherlands, have attempted to estimate the full fuel cycle analysis of solar arrays. They include in their analysis the impacts of improvements in panel production and use efficiencies. They found that the time needed for a solar panel to produce as much energy as was involved in its creation has fallen from about 20 years, 40 years ago, to now, about 2 years or less. They found that for every doubling of the world's solar capacity the energy required to make a panel fell by about 12 per cent and associated carbon emissions by 12 to 24 per cent. And that the emissions break-even could have occurred in 1997 and even under the most pessimistic assumptions will occur by 2019.

9.4 Energy efficiency

9.4.1 Energy Efficiency Market Report, 2016 (EEMR16), International Energy Agency (IEA)

This comprehensive review of energy efficiency trends to 2016 indicates significant progress is being made on energy efficiency improvement but that significant potential remains. To realise this potential the report strongly endorses non-price policies to accompany full long-run energy pricing.

Introduction, summary

The IEA view is that energy efficiency is central to energy policies. The IEA estimates two-thirds of the energy efficiency potential remains untapped. Progress is being made, but is neither fast nor deep enough to meet energy and climate change targets. Despite lower than optimal energy prices, strong, well designed policy can tap this potential.

Energy efficiency levels in IEA member countries improved, on average, by 14 per cent from 2000 to 2014, reducing total energy expenditure by an estimated US\$540 billion in 2015, while GDP growth in the period was 2 per cent per year on average. These trends resulted in low growth in primary energy demands.

In China, a major focus of the IEA report, primary energy demand increased by 0.9 per cent while GDP grew by 6.9 per cent in 2015. Energy efficiency investment of US\$370 billion over 2006 to 2014 avoided the need for over US\$260 billion in investment in new electricity generation (mainly coal) and avoided emissions of 1.2 billion tonnes of CO_2e in 2014. But China's 2015 energy intensity (energy/unit of GDP) levels are still 50 per cent higher than the OECD average.

Energy efficiency investment in China

The IEA estimates that efficiency gains in China since 2000 have led to 350 Mt of coal use being avoided per year, equal to 6 per cent of global coal production and 29 per cent of international trade in coal in 2014. Renewables and nuclear are combining to reduce China's reliance on coal generation. Total final consumption growth is below activity (GDP) growth mainly due to energy efficiency improvements which have raised overall energy productivity. Energy consumption per unit of value added improved by 19 per cent from 2000 to 2014 in the industry, services and agricultural sectors, with considerable variation by sub-sector; for example, by 53 per cent in pulp and paper and 20 per cent in chemicals due to structural and price effects. From 2000 to 2015 energy efficiency

improvements in China have avoided an estimated 326 Mtoe of total primary energy supply, significantly reducing business as usual CO_2 and noxious emissions. However serious **urban air quality** problems and GHG emissions remain.

Avoided (below business as usual) energy costs for industry and consumers thanks to energy efficiency improvements, as well as avoided energy imports and energy supply, have been substantial. For example, the IEA estimates that China's spending on energy imports was reduced by US\$10 billion in 2015.

Total Chinese public and private investment in energy efficiency improvement was US\$249 billion over 2010 to 2014: 12 per cent from the central government, 2.8 per cent from regional governments and 85 per cent from private sources. This resulted in 47 per cent of the reduction in energy intensity and savings of 199 Mtoe.

Efficient equipment demonstrations received the most investment followed by upgrades to coal-fired boilers, but waste heat projects generated the most energy savings: energy management systems were a significant part of the energy efficiency investments. Energy-intensive sectors and public institutions set the benchmark that others were required to achieve. As of July 2016, 16 top runner standards have been proposed for industrial production, including for ethylene, synthesis ammonia, cement, plate glass and electrolytic aluminium.

The 13th Five Year Plan (2015 to 2020) aims to set, for the first time, a cap on energy consumption in China of 3,500 Mtoe. In addition, China wants to reduce energy intensity to 44 per cent below 2005 levels by 2020 – a 15 per cent reduction between 2015 and 2020. China succeeded in reducing energy intensity under each of the previous two five year plans, by 19 per cent in 2010 and 34 per cent in 2015 (Figure 2.11). Energy savings based on a fixed intensity baseline over the five-year period to 2010 were 441 Mtoe, rising to 469 Mtoe over the five-year period to 2015. The target is 560 Mtoe over the period to 2020.

In its current five year plan China plans to move away from direct government subsidies for energy efficiency investment and towards market based approaches such as energy service companies, for which it provides risk guarantees and dedicated credit lines. Planned investment in energy efficiency is estimated at US\$270 billion to save about 560 Mtoe/year by 2020. The main savings are expected from shifts in economic structure: industry to services and from high-intensity manufacturing to lighter manufacturing plus significant savings from building heating and the high-energy industries.

EEI intensity pathways

China's current income per capita is about that of South Korea in 1968 and Japan in 1959. Currently industry contributes 44 per cent of GDP, similar to Japan and Korea when their income per capita was at China's current level.

Since 1968 the energy intensity of Japan's GDP has declined by 45 per cent and industry share of the economy has gone from 44 to 26 per cent. Energy efficiency and energy intensity improvements have limited Japan's total fuel consumption growth to 96 per cent over 1968 levels and 3 per cent over 1990 levels.

Growth expectations for China are different from historic growth levels in Japan. If China followed Japan's trajectory the energy intensity of total fuel consumption in 2030 would be 0.096 toe/1,000 US\$ (at purchasing power parity) which is 31 per cent lower than intensity levels in 2013 and only slightly higher than OECD average of 0.090 toe in 2013. To follow Japan's track, Chinese energy intensity would need to decrease by 2.2 per cent per year to 2030, about the same as Japan over its years of strong economic growth. For all OECD countries the average annual reduction in energy intensity was 1.8 per cent over the last 40 years.

In IEA's 450 ppm climate change scenario, the total fuel consumption per unit GDP declines to 0.059 toe, 58 per cent lower than energy intensity in 2013. In the 450 ppm scenario Chinese energy intensity in terms of total fuel consumption improves by 5 per cent per year.

To achieve China's role in the global 450 ppm scenario the government needs to effectively manage structural economic change and continue to promote and mandate energy efficiency in all sectors. The level and scale of energy efficiency improvement would have to be more than double the rate that Japan and other OECD countries previously achieved, which would establish China as a global leader in energy efficiency. Fortunately the relevant technologies are either available or under development.

Policy drivers of the global energy efficiency market

Highlights of IEA analysis

- Efficiency policy is the most important tool to shape national energy markets and has delivered substantial energy savings. In particular, mandatory standards and targets have achieved significant energy savings over the past three decades. Vehicle fuel economy standards, implemented as early as 1978, saved 2.3 million barrels per day (mb/d) of oil consumption worldwide in 2015. Energy savings from appliance standards were equivalent to 7 per cent of final energy consumption in the United States and 4.5 per cent of primary energy demand in the European Union in 2015.
- In 2015, mandatory energy efficiency policies (performance standards and mandatory targets) covered 30 per cent of the world's energy consumption, up from 11 per cent in 2000. The highest sector coverage (37 per cent of energy consumption) is in industry led by mandatory targets covering 82 per cent of industrial energy consumption in China and 37 per cent in India. The most dramatic increase in the coverage of standards is in lighting, which jumped from 2 per cent of lighting energy use is subject to standards, via building energy codes and minimum energy performance standards on equipment. Vehicle standards now cover three-quarters of new car sales worldwide and over 50 per cent of the energy consumption of the global light-duty vehicle fleet.
- Mandatory policies on appliances, equipment and vehicles worldwide have strengthened by an average of 23 per cent since 2005. The greatest strengthening (as measured by increasing mandated performance levels) was in space and water heating equipment in the residential sector. Standards affecting demand for space heating in particular have strengthened by more than 40 per cent since 2005.
- The new IEA Efficiency Policy Progress Index measures the rate of improvement in efficiency policies by combining changes in mandated performance levels with changes in the share of final consumption covered by mandatory policy. Globally, the index has improved by 7.3 per cent since 2005. At 15 per cent, the residential sector showed the largest improvement, driven by improved standards for space heating and cooling, water heating, and appliances. The most influential single policy on the increase in the efficiency policy progress index since 2005 was China's Top 10,000 program for industrial energy consumption.

Substantial potential exists for mandatory measures to save even more energy. If vehicle efficiency standards were expanded to all countries, and standard performance levels had increased to a rate equivalent to the best-performing current standards over the past ten years, energy savings in 2015 would have almost doubled to 4.3 mb/d. Best-in-class energy performance standards on air conditioning, space and water heating, and lighting would have saved 13 exajoules (EJ) of energy, or 14 per cent of global residential energy consumption.

Achievement of these savings would lead to reduce investment in energy supply projects and the consequent environmental impacts of this energy supply.

The IEA sees five broad categories of instruments to achieve energy efficiency targets:

- mandatory standards (especially for equipment and buildings);
- mandatory energy savings targets and obligations;
- labelling and information;
- financial incentives to energy efficiency; and
- financial disincentives for energy inefficiency.

9.5 The market for energy efficiency services

Highlights

- A burgeoning market exists for energy efficiency services, in which energy efficiency trades almost as a commodity that is bought and sold. Dedicated energy service companies alone represented a market of 24 billion United States dollars in 2015. In China energy service revenues were USD 13.3 billion, in the United States USD 6.3 billion, and in the European Union USD 2.7 billion.
- Policy contributes to supporting and shaping the energy efficiency services market, with particular progress seen in China, India and the United States. The size and nature of the market (in terms of, for example, preferred contract structure and sector) are influenced by both framework policies and direct financial support. In the United States, policy has led to a focus on public buildings using the energy service company model. In China, the energy service market has grown rapidly as a result of policy and subsidies set out over successive Five-Year Plans. India has a state-backed energy service company, which is helping to drive efficient lighting solutions.
- Three broad trends point to further growth of the energy efficiency services market: mergers and acquisitions activity, new technologies, and innovative utility business models. The number of acquisitions is rising, with more than 50 per cent initiated by companies that were not previously in the energy efficiency services market.
- Investors are showing strong interest in "green" bonds, which often have a large component of energy efficiency services. Green bonds grew to USD 42 billion in 2015, with energy efficiency attracting the second-largest investment (20 per cent) after renewable energy (46 per cent). Recent trends in standardisation and climate finance may prompt further growth.

The energy efficiency services market is rapidly developing: it is more developed in China, the United States, the EU and India (where it is mainly government driven). There is growing interest in green financial products, which provides more funding for energy efficiency.

9.6 Electricity trends

The South Australian power disruptions, the closure of the Hazelwood generator (1,600 MW) and the supply disruption to the Portland (Victoria) aluminium plant dominated electricity system discussions in the fourth quarter of 2016 and the first quarter of 2017 in Australia.

Electricity prices in Australia rose by around 10 per cent annually over 2008 to 2013, mainly driven by network investments. Price rises then moderated but are now beginning to rise again due to wholesale price increases driven by generator closures and gas price increases, these latter in response to supply constraints. The cost of policies such as the renewable energy target and feed-in-tariffs represented about 6.2 per cent of the average household bill in financial year 2015 but the proportion is declining as the cost of fossil-fuel generated electricity rises due to plant closures and the high cost of replacement plant (which, given the COP22 target, is likely to be renewable). Network charges vary between jurisdictions but represent around 43 per cent of the retail price (transmission 7 per cent, distribution 36 per cent). These increased significantly to 2012 but now stabilising as allowable network investments are lowered.

9.6.1 AEMC report

On 11 December 2016, an AEMC study was released which showed the Hazelwood closure would have a varying impact across the National Electricity Market (NEM) over 2017 to 2019.

For the average annual household electricity bill:

- an increase of \$99 (about 7 per cent) in Victoria;
- an increase of \$74 in New South Wales (about 4 per cent);
- an increase of \$204 in Tasmania (about 10 per cent); and
- an increase of \$150 in South Australia (about 7 per cent).

AGL, on 26 November, announced standing offer prices of electricity and gas in Victoria in 2017. The Hazelwood power station closure in March 2017 was estimated to increase wholesale electricity prices, resulting in a 9.9 per cent increase in residential retail prices and 13.4 per cent for small business customers.

9.6.2 Independent Review into the Future Security of the National Electricity Market, Preliminary Report, December 2016 (IRFS NEM, 16)

This review, as the title states, discusses the future security of the National Electricity Market, the longest connected power system in the world, situated in eastern Australia from Queensland to South Australia and Tasmania and serving 80 per cent of Australia's electricity consumption.

Today, and in the future, new electrical technologies are emerging which make system management more complex. Partly because greenhouse gas emission targets are a significant part of energy policy but also in response to changes in technology, the proportion of electricity generation capacity which supplies variable renewable electricity that cannot be fully controlled and dispatched to meet customer loads has been increasing. Solutions to variable generation issues are available and being effectively implemented overseas but the National Electricity Market is not currently specified so as to encourage their adoption and ensure a reliable and secure electricity system. This Preliminary Report does not contain findings or recommendations. Instead, it fulfils the role of an issues paper, setting out observations and questions to guide a process of open consultation on the design of a new blueprint for the electricity sector.

Seven key themes are identified, each supported by specific questions to be raised with the community.

- 1. Technology is transforming the electricity sector.
- 2. Consumers are driving change.
- 3. The transition to a low emissions economy is underway.
- 4. Variable renewable electricity generators, such as wind and solar PV, can be effectively integrated into the system.
- 5. Market design can support security and reliability.
- 6. Prices have risen substantially in the last five years.
- 7. Energy market governance is critical.

Some of the key questions for the future of our energy system include:

- How do we ensure the National Electricity Market can take advantage of new technologies and business models?
- How do we ensure the National Electricity Market meets the needs of all consumers, including residential, large-scale industrial and vulnerable consumers?
- What role should the electricity sector play in meeting Australia's emissions reduction targets?
- What are the barriers to investment in the electricity sector?
- What immediate actions can we take to reduce risks to grid security and reliability?
- Is there a role for technologies at consumers' premises in improving energy security and reliability?
- What role is there for new planning and technical frameworks to complement current market operations?
- How can markets help support additional system security services?
- How can we improve the supply of gas for electricity generation to contribute to reliability and security?
- How can we ensure that competitive retail markets are effective and consumers are paying no more than necessary for electricity?
- What are the optimal governance structures to support system security, the integration of energy and emissions reduction policy, and affordable electricity?
- How should the regional impacts of all these changes be addressed?

Between 2008-09 and 2012-13 the average price of residential electricity rose 61 per cent compared with a 10.4 per cent increase in the CPI, mainly due to network (distribution, transmission) costs. In the period to 2020 and beyond, wholesale electricity prices are expected to rise due to coal generator closures and gas price increases and the potential impacts of climate change policies.

The report states that recent events highlight the need for action.

9.7 Grid storage

Tesla is working with Californian utilities to install storages on the Californian grid. This is to utilise PV, wind generation and other generation at times when there can be excess generation and store it in Tesla battery packs for use in peak demand periods. Up to 3,000 MWhs is currently in operation and/or planned with a potential future expansion.

Battery storage is still costly but can compete with gas peakers now facing much tighter environmental regulations and cooling water constraints. As battery storage costs reduce and fossil plant constraints increase, grid storage will become increasingly viable around the world, including Australia.

In February 2017, the Prime Minister promoted the idea of pump storage as a potential contributor to electricity system reliability by storing electricity generated in non-peak periods for use in emergencies and/or peak periods. There remain many questions to be answered and the Federal Government is committing A\$20 million to examine pumped storage feasibility.

9.8 Natural gas

Driven mainly by increases in electricity generation demands, global trade in gas (mainly via LNG) is increasing. Australia is benefiting significantly from this trend and from Australia's huge gas resources base.

In 2017-18 higher LNG export values and volumes could lift export values by around 50 per cent to nearly A\$40 billion. A potential risk to future performance is increased competition from North America, the Middle East and Africa into the 2019 to 2025 period, and by a nuclear generation resurgence.

On 8 March 2017 the Australian Energy Market Operator released a report which warned of eastern Australia gas shortages which could lead to gas supply disruptions for gas generator and/or gas endusers, particularly in South Australia by the summer of 2018-19, Victoria and New South Wales in 2020-21 and Queensland between 2030 and 2036. Rising gas demands for export from the new terminals at Gladstone (QLD), rising domestic demand combined with declining production from existing fields, 'lock the gate' restrictions on on-shore gas exploration and limited new pipeline investment, were cited as the causes of the tightening of gas supply. As a result of the report a meeting between gas supply companies and the Federal Government to discuss solutions to the situation was called for late March 2017.

The introduction of a "national interest" export test was considered but is strongly opposed by gas suppliers (existing, potential) who see such a policy as a disincentive for gas exploration, development and exports. However the export test is used in Canada and the United States without any reported negative impacts.

Another option, being trialled in Queensland and South Australia, is to tender for supply of gas to be used domestically. This could be combined with a reverse auction to lower costs of gas supply. Another option, being applied in Western Australia (which is not connected to the Eastern States gas pipeline system) is to issue exploration licences for supply of domestic gas. Policies under discussion include incentives for increased east coast gas exploration and development and, more radically, whether a west to east pipeline should be built.

On the demand side, energy efficiency in generation and end-use could be strongly promoted, as could gas substitution (to electricity and renewables) and evening out of gas use in generation and end-use. However, with the closure of coal generators, particularly Hazelwood (1,600 MW) in March 2017, and even with declining grid electricity demand, the current and looming gas situation will affect electricity supply and prices in eastern Australia. Increased gas generation will be required to fill the coal generation closure void and to "load follow" intermittent generation from solar (large and small scale) and wind. Will gas generation be available when required? It was not when required in South Australia in January 2017. New gas electricity supply arrangements are required, along with consideration (in South Australia and Victoria) of increased on-grid and enhanced behind-the-meter storage.

The South Australian policy announcement of 14 March 2017 included storage, new gas peaker (two plants, one publicly owned) investment, gas exploration and development incentives and the right of the South Australian Government to mandate gas peaker plant operation when supply was threatened. This policy package is designed to achieve security of supply for South Australia. It was generally welcomed by industry and analysts but was criticised by the Federal Government for the "go-it-alone" stance and potential conflict with the National Electricity Market operation in eastern Australia. It did, however, underline the absence, till then, of strong Federal action on energy policy.

Later, on 15 March, the Federal Government announced a major capacity expansion to the 4,100 MW Snowy Mountain's Hydro Electricity Scheme, built over 1949 to 1975, which is 13 per cent owned by the Federal Government, 58 per cent by the New South Wales State Government and 29 per cent by the Victorian State Government. (It is uncertain whether these two state governments were consulted on the Federal proposal). The expansion would involve significant tunnelling and generation investment for pumped storage to increase capacity by 50 per cent, but would not involve new dams and would, it was claimed, not affect the water supply for the irrigation role of the scheme. The investment would be A\$1.5 to A\$2.0 billion over 5 years. Once completed the expansion, together with transmission upgrades, could provide enhanced security in eastern Australia without an increase in greenhouse gas emissions **if** the storage pumping were hydro. It could obviate or complement battery storage and potentially replace, eventually, much of the South Australian policy package.

9.9 The role of local government

Local government has a long history of involvement in the energy industries. At various times Councils have run electricity generation and distribution businesses, though these have been superseded in the Eastern States by the National Electricity Market, in WA by the South West Integrated System and other state government initiatives, and in remote areas by decentralised generation, in the NT run by the Power and Water Corporation. It is unlikely that Councils will reenter the generation business (apart from the installation of PV and perhaps wind capacity on Council properties) but possible that Councils will again be involved in aspects of reticulation. The current position is that electricity distribution is in the hands of large, cross-regional regulated monopolies, some of them privatised, which limits the scope for the reintroduction of municipal enterprise.

This said, local government has a strong interest in the reliability of electricity supply and hence in the local layout of the grid, including modifications required to meet the changed geography of supply as it moves from central to distributed generation. Other local government interests in energy efficiency include the local promotion of cogeneration – the joint generation of electricity and useable heat, which by capturing energy which would otherwise have gone to waste has considerable potential for greenhouse gas emission abatement. Energy efficiency is considerably improved by the utilisation of otherwise waste heat, and councils will often be in a position to identify sources and users and devise means to connect the two, at a minimum by facilitating the

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necessary easements and possibly by itself providing the service. By and large Australia does not require the high levels of domestic heating to sustain life in winter in high-latitude countries, but there will still be opportunities. Such local institutions as hospitals and swimming pools are possible places to start.

The adaptation of cogeneration to warm-country conditions which create a demand for airconditioning is under way in countries like Singapore and the United Arab Emirates and there will be a role for local government in facilitating the reticulation of cold air and water.

Apart from the past role of some councils in the electricity supply industry and the possibilities in cogeneration, local government has a strong influence on the implementation of energy efficiency programs, particularly:

- the enforcement of building energy efficiency standards both residential and commercial buildings, covering not only construction standards but such matters as building orientation. Building inspectors have traditionally concentrated on safety and fire regulations and have a very poor record in the enforcement of legislated energy efficiency standards. Even if councils are not directly responsible for the achievement of energy efficiency standards, it may be possible for them to test new buildings in order to certify that standards have been met;
- town-planning measures to encourage energy conservation, particularly in transport; and
- provision of waste management services at minimum energy cost, including such areas as methane recovery.

To drive home the importance of enforcing building energy efficiency standards the 2013-2014 CSIRO study of new 5-star housing in Melbourne, Brisbane and Sydney showed that 60 per cent of houses did not comply with the 5-star code because of poor quality installation of insulation and non-compliance to leakage guidelines. A common problem with insulation was found to be in walls and in the areas surrounding downlights in roof spaces. The CSIRO's rigorous inspection of new housing for this study used thermography and blower door testing to identify leakage and other energy inefficiencies. The report recommendations included improved training and auditing of building inspectors and training and certification of independent building thermal performance auditors. The CSIRO have also developed a software tool, AccuRate, to assist designers and architects to model their housing designs in fine detail to calculate temperatures, heating and cooling requirements and energy efficiency.

9.10 Conclusion

The way in which energy policy and the differing expectations of the community regarding the development of new energy technologies, coal fired generation, the environment and climate change have shown to be a disruptive mix with the potential for a significant and lasting impact on productivity and the competitiveness of much of Australian industry. The numerous changes to policy of the last decade or more, which have resulted in an inconsistent approach to energy policy, and the confusion that has created, has neither been good for industry or households. The risk for industry is the element of uncertainty, which the lack of clearly defined and consistent policy has introduced to future strategies and investments. The need for forward looking and durable energy polices is central to further productivity gains, economic development and prosperity across the nation.

In relation to energy efficiency improvements a number of issues stand out. While the design and planning for houses takes into account energy efficiency improvements these do not necessarily translate into successful implementation of standards during construction. Poor construction standards and compliance mean a significant proportion of new housing does not meet 5-star code requirements, this in turn means that householders will have higher energy bills than if homes were compliant with the standards. Expand this issue at scale and then it becomes a regional economic issue as well as an environmental one.

To address this very serious issue, a greater effort is required to train trades people in relation to energy efficiency standards. This means improved training of builders, and insulation/air sealing installers; improved training and auditing of building inspectors; and training and certification of independent building thermal performance auditors.

As well as training, the provision of timely and up to date information in relation to improving energy efficiency is an essential component in developing a region, which is protected, to at least some degree, from fluctuating energy prices and the vagaries of energy policy. Advice should cover such areas as installation and advice on insulation, renewables, including wind and solar and battery storage systems. The advice given should be based on sound training in these areas.

Skills requirements in the construction and energy sectors change with the use of new technologies, building techniques and materials and that means that there are both increasing and decreasing demand for particular skills. For example there is declining demand for skills in metallurgy and increasing demand for skills in renewables (solar, wind, biomass) and associated fields. Knowledge of energy efficiency improvement techniques in buildings is also important.

10. Local government finance

Across Australia, local government taxation revenue (mainly from rates) increased by 3.8 per cent from 2014-15 to 2015-16 (ABS government finance statistics). Given that the costs of local government service provision increased by an estimated 2.7 per cent, the real increase in revenue was 1.1 per cent. The national population increased by 1.4 per cent, so the increase in rate revenue was not quite sufficient to maintain real service expenditure per capita.

In six of the eight states and territories real rate revenue kept pace with population growth; the national shortfall was due to lagging revenue in NSW and Queensland. Within each state the majority of councils followed the state trend, though in WA rate collections in the metropolitan area increased more rapidly than those in the country.

The political culture of the states and territories affects local government revenue-raising, with revenue effort (and the level of local services) noticeably above national average, per capita, in Victoria, SA, WA and the ACT; around national average in Tasmania and below average in NSW and the NT.

Among SOR regions, in 2015-16 the highest rate revenue per capita was reported by Melbourne City, thanks to a high proportion of commercial ratepayers. Collections were also above national average in the core metropolitan regions of Perth and Adelaide, but not in Sydney or Brisbane.

Rate collections per capita were well above national average in non-metropolitan WA, SA and Victoria. Some of these are mining-based regions which have succeeded in collecting reasonable levels of rates from mine properties, but they also contain a high proportion of farm households not all of whom are in a good position to contribute large sums to local finance. Collections were at or a little above the national average of \$706 per capita in Tasmania and non-metropolitan Queensland but were well below the national average in rural NSW.

In the commuter suburbs rates collected per capita were generally below the rural areas and the metropolitan core regions of their state. Collections per capita were around national average in the commuter suburbs of Melbourne and Adelaide, somewhat below in the commuter suburbs of Perth, definitely below in the commuter suburbs of Brisbane and even further below in the commuter suburbs of Sydney. The long-standing NSW state government policy of capping rates has been effective in limiting rate effort in that state. These limits are particularly noticeable in the Sydney metropolitan area, where regions with some of Australia's wealthiest residents raised Australia's lowest levels of rate revenue per capita - \$400 a head in Sydney Northern Shores and Sydney South East.

As a tax, rates have several important advantages. Most obviously, rates cannot be avoided by shifting the tax base to a low-tax jurisdiction or overseas, as so often happens with corporate profits. Rates have the further economic advantage, at least in theory, that they do not affect incentives to put land to its best use. Their major disadvantage is inherent in taxation that is limited to local areas. It is scarcely fair that the wealthiest households in Australia pay low rates in the dollar, while farm households which are struggling against low prices and the effects of climate change pay high rates in the dollar, not only on their farmsteads but on their main business asset as well. The system of Commonwealth financial assistance grants for local government was designed to partially overcome this inequity, and as outlined in the preceding chapters of this report (especially chapters 2 and 3) the case for 'horizontal equalisation' grants to councils located in regions with low revenue-raising capacity, high expenditure needs and (as it happens) high potential for generating export revenue has never been stronger.

Federal grants to local government are divided into two main categories; general assistance and assistance for roads. General assistance is distributed on the recommendation of each state local government grants commission and the NT commission on a horizontal equalisation basis, subject to a minimum per-capital grant. The pattern of distribution of general purpose grants within each state/territory is similar; in 2016 metropolitan councils with high commercial rateable capacity received the minimum grant of around \$20 per capita, while outlying agriculture-based and mining-based councils received much larger amounts per capita – up to a regional average of \$374 per capita in WA Wheatbelt Great Southern. In other words, the general purpose grants redistribute strongly from wealthy regions, favoured by recent economic trends and policies, to regions which need catch-up assistance. This said, the grants are limited by the Commonwealth's budget allocations and are far too small to equalise completely.

Not only is the federal grant limited in total; it is divided between the states per capita, which means that equalisation funds fall particularly short in those states (and the NT) where high-needs councils serve large areas with small populations. Lack of total funds would be a factor in the assessment by the state grants commissions in WA and Queensland that the needs of remote-area councils outweigh the claims of low-wealth suburbs, so that most councils in SEQ and Perth are on the minimum grant. By contrast, in Sydney, Melbourne and Adelaide low-wealth outer suburban councils received nearly double the minimum grant, around \$40 per capita. This has not precluded the grants commissions in those states from providing grants of \$200-250 per capita (and sometimes more) to high-needs councils away from the metropolitan areas.

The greater part of roads assistance is distributed by the grants commissions on the basis of roads' needs, but part is distributed on a project basis through the R2R program. In 2016 roads grants averaged \$29 per capita, with the amounts distributed ranging from \$5 per capita to councils in inner metropolitan Sydney and Melbourne to \$233 per capita in WA Wheatbelt Great Southern. Once again the program accords strongly with the need for regional redistribution of resources identified in Chapter 2 above.

Across Australia, in 2016 councils received grants of \$94 per capita, considerably less than their own rate revenue of \$706 per capita but an important source of funds in regions with high costs and low revenue-raising capacity. Across the regions, receipts per capita ranged from \$23 in Melbourne City to \$606 per capita in WA Wheatbelt Great Southern, with high receipts also in WA Gascoyne Goldfields, NSW Orana, NSW Murray Far West, NSW Murrumbidgee, Qld Darling Downs SW and SA Far North and West.

As a result of these distributions, councils in the metropolitan core regions are minimally grantdependent – grants are 5 per cent or less of the total of grant plus rate revenue. Dependence rises to around 10 per cent in the outer metropolitan commuter suburbs of Sydney, Melbourne and Adelaide and in the independent cities. It reaches around 20 per cent in the benefit-dependent lifestyle regions and in the more prosperous mining-dependent regions, and rises to 40 per cent or so in the agriculture-based regions of WA (thanks to relatively generous grants) and their equivalent regions in NSW (thanks to capped rates).

Roads grants are particularly important component of the total grant in Tasmania and the NT, presumably to counteract the inadequacy of general purpose grants distributed between the states per-capita. They also form a relatively high proportion of the total grant in SEQ and Perth, where general purpose grants are curtailed to the minimum level despite the needs of low-income developing suburbs. The reverse applies in the outer suburbs of Melbourne and in some of the independent cities, where relatively generous general purpose grants are counterbalanced by less generous roads grants.

The local government grant program administered by the states and NT grants commissions (though not the R2R program) is effort-neutral; the Commonwealth does not place conditions that the funds should be spent this way or that rate effort should be maintained. However, in point of fact rate effort has been maintained (with a question mark over NSW, where the failure is not the fault of local government) and the grants have been spent to maintain and improve services, at local choice. There is a strong parallel with the need for local control over economic development strategy discussed in Chapter 1. This is not to argue that funds for economic development should be allocated in the same way as horizontal equalisation grants (though an increase in these grants, including the resumption of full indexation, is a start) but it is to argue that those who are responsible for financing future regional economic development strategies will have much to learn from nearly 50 years' experience in the distribution of general purpose and roads grants.

Two conclusions stand out.

- With the exception of some rate-capped councils in NSW, local government continues to set an example to other levels of government in revenue effort.
- The grants program continues to address the need for horizontal equalisation, inadequately perhaps as regards total funding, but effectively given the funding available. As pointed out in Chapter 2, the need is increasing, and experience with the allocation of equalisation and roads grants has potential to contribute to the allocation of funds to regional economic development strategies.

11. Metro regions

Australia's five major metropolitan areas centre on the capitals of the five large states. Each comprises two or more SOR regions and some include additional LGAs from adjacent regions. The five are:

- Sydney (south of the Hawkesbury and north of the Illawarra escarpment, thus excluding Central Coast and Illawarra, though both of these urban areas have strong links with Sydney);
- Melbourne (excluding Geelong, which has long been an independent city);
- Brisbane (excluding Gold Coast and Sunshine Coast, both of which, though somewhat integrated with Brisbane, are best considered as independent urban regions);
- Adelaide (including adjoining urban LGAs in SA Fleurieu and SA North); and
- Perth (including adjoining urban LGAs in WA Peel SW).

In addition to these metropolitan areas, several independent cities occupy the whole or most of a SOR region. These include the three smaller capitals (Canberra, ACT), Hobart (Tasmania South) and Darwin (NT Darwin), and also the Sunshine Coast (SEQ Sunshine Coast), the Gold Coast (SEQ Gold Coast), Newcastle (NSW Coastal Hunter), Wollongong (NSW Illawarra) and Geelong (Vic Geelong). These single-region cities can be compared with the metropolitan areas by referring to the data in Appendix 1.

11.1 Economic base

In Chapter 3 of this report we argued that the economic base of a region can be identified by its exports. As regards the metropolitan areas, we identify six major classes of export:

- Agriculture and mining and (more important for cities) their derivatives in food processing, mining services and primary metal processing;
- Tourism, including accommodation and various shopfront businesses likely to be patronised by tourists;
- Finance, including banking, superannuation and insurance;
- Other knowledge-economy services, ranging from the media through to tertiary education; and
- Other services, including wholesale and retail trade, public administration and defence, school education and health and welfare services.

The five metropolitan areas differ in their mix of exports, as follows.

- Sydney is relatively dependent on finance and tourism exports, about average in its exports of other professional services and other services, and below average in its dependence on primary and manufactured exports.
- Melbourne is relatively dependent on manufactured exports and other professional services and comes a close second to Sydney in finance exports. Its proportions of primary, tourism and other exports are less than in the other cities.

- Brisbane comes second to Perth in its dependence on primary exports, second to Melbourne in its dependence on manufactured exports, second to Sydney in its dependence on tourism exports. Finance, other professional services and other exports are not so prominent in its export mix.
- Of the five metropolitan areas, Adelaide has the greatest dependence on other exports (public administration and the like) and is high on the list for other professional services. Its proportion of both primary and manufactured exports is about average and it does not rely much on tourism exports. The proportion of financial services in its exports is well below Melbourne and Sydney but well above Brisbane and Perth.
- As the capital of a mining-boom state, Perth has a high proportion of primary exports in its export mix (both services to mining and mineral processing). As an offsets to this high proportion, it has low proportions of general manufactured exports, tourism exports, financial exports and professional service exports, though it comes second to Adelaide in the prominence of other exports.

Thanks to the prominence of primary products in their export mix, a quarter of the exports from Brisbane and Perth go overseas; in the other three metropolitan areas this proportion is around 15 per cent. Perth comes close to maintaining balanced overseas trade, but all the other metropolitan areas (and especially Sydney) run deficits on their balances of overseas trade of around 10 per cent of gross value added.

Sydney makes up for its excess of international imports over international exports with strong interregional exports and actually runs a balance of trade surplus. This can be traced to its exports of financial and other knowledge-intensive services to the rest of the country. Melbourne runs a small deficit and Adelaide and Brisbane run somewhat larger deficits. Despite its positive international trade balance, Perth runs the largest overall trade deficit, whether judged per capita or in relation to GRP. Thanks to its isolated position, interregional trade with the rest of Australia is less important in Perth than in the other capitals, and the balance of such interregional trade as there is, is strongly weighted to imports. In Perth prosperity is accordingly financed more heavily from financial flows than in the other capitals.

The importance of the knowledge economy and the effects of the mining boom provide themes for the rest of this chapter.

11.2 Population growth

The five metropolitan areas currently house 64 per cent of Australia's population, up two percentage points in just a year. In 2016-17 they accounted for 86 per cent of national population growth, with much of the remaining growth taking place in the other eight single-region cities. The aggregate population of the five metropolitan cities grew by 1.8 per cent, which was about the same as in 2015-16. The non-metropolitan population grew by 0.5 per cent, well below the 1.2 per cent achieved the previous year.

Sydney houses 19.5 per cent of Australia's population. In 2016-17 it attracted nearly one-third of national population growth, sufficient to raise its population by 2.2 per cent – a significant increase over the 1.8 per cent increase the previous year. As noted in the *State of the Regions* report for 2016-17, Sydney has recently experienced a spurt of growth based on past investment in its knowledge-based industries. The problem of supplying commuters to its metropolitan core has been addressed, at least to a degree, by public investment in transport and by private investment in new inner-suburban apartments.

Melbourne accommodates 19.1 per cent of Australia's population and is currently growing a little less rapidly than Sydney, at 2 per cent a year – a decline from 2.4 per cent in 2015-16. As in Sydney, growth is based on the knowledge-economy of the inner city and has been supported by transport investments and apartment building. Melbourne is also benefiting from a revival of manufacturing as the exchange rate has fallen from its mining-boom heights, though this revival is faltering due to the closedown of the automotive manufacturing industry.

Brisbane is home to 9.9 per cent of the Australian population. In 2016-17 its population grew by 1.6 per cent, a decline from 1.8 per cent the previous year. The population has continued to grow despite a faltering economic base – with the decline of construction activity on the coalfields, Queenslanders are returning to the state capital.

Perth accommodates 9.4 per cent of Australia's people, a proportion that was until recently rising rapidly thanks to the mining boom. Perth has been severely affected by the passing of the construction phase of the mining boom, but like Brisbane its population has continued to grow thanks more to repatriation of workers and their families from remote construction sites than to the strengths of its own economic base. In 2016-17 its population grew by 1.5 per cent, a little over national average and a little bit faster than in the previous year.

Adelaide accommodates 6.1 per cent of the Australian population. In 2016-17 its population grew by 0.8 per cent, slightly faster than the previous year but below the national average rate of 1.3 per cent. Adelaide has suffered from the decline of manufacturing relative to financial services – the latter being an industry in which Adelaide still holds its own but has difficulty competing with the economies of scale available in Sydney and Melbourne. With a less diversified manufacturing base than Melbourne or Sydney, Adelaide has yet to experience a revival in manufacturing employment.

The population of the metropolitan areas is younger than the Australian population as a whole, thanks to a combination of rural-urban migration and ageing-in-situ in non-metropolitan regions with low population growth. The exception to the rule is Adelaide, where, owing to low growth, the proportion of the population aged 55 and over is 3 per cent above national average and the proportion of people aged less than 20 is 2 per cent below. The opposite is true in Brisbane, where the proportion of the population aged 55 and over is 3 per cent less than in the country as a whole, and the proportion of children in the population is 1 per cent over national average. The other metropolitan areas are marked by above-average proportions of residents of workforce age, in Sydney and Perth concentrating on the 30-54 age group (in Sydney 2 per cent over national average) and in Melbourne more evenly spread between people in their twenties and those aged 30-54.

11.3 The labour force

Thanks to its favourable age structure, in 2016-17 Melbourne experienced the most rapid growth in the workforce of all the five metropolitan areas – 3.5 per cent, well ahead of population growth. This was more than matched by growth in employment, but the workforce participation rate also increased and the NIEIR unemployment rate changed very little. Average hours worked per worker per week increased towards national average and the proportion of the population of workforce age not in work fell towards national average.

In Adelaide the increase in the workforce was more subdued – 1.1 per cent – but as in Melbourne this was ahead of population growth. Again as in Melbourne, employment increased more rapidly than the workforce, sufficiently to ensure that Adelaide was the only metropolitan area in which the NIEIR unemployment rate declined. Average hours worked per worker per week increased and as in Melbourne the proportion of the population of workforce age not in work fell. Reflecting the adverse effect on Adelaide of national policies pursued over the past three decades, the proportion remained above national average.

In the other three metropolitan areas the workforce grew less rapidly than population. The difference was most marked in the two capital cities where the hangover from the mining boom was most severe – Brisbane and Perth. Not only did the workforce grow less rapidly than population (0.3 per cent in Perth, 0.8 per cent in Brisbane, compared with population growth rates of 1.5 per cent and 1.6 per cent respectively); employment was stagnant (down by 0.5 per cent in Perth and up by 0.2 per cent in Brisbane). The result in both cases was an increase in the number of unemployed people of about 10 per cent, raising the NIEIR unemployment rate to 7.9 per cent in Brisbane and 7.0 per cent in Perth – in both cases still below the rate in the rest of the state, hence continuing rural-urban migration. In both cities hours worked per worker per week decreased and the proportion of the population of workforce age not in work increased.

This leaves Sydney, where, despite signs of revival in manufacturing, the workforce grew less rapidly than the population (1.0 per cent compared with 2.2 per cent) and employment growth barely kept up with workforce growth. In Sydney NIEIR unemployment increased by 2.7 per cent, which raised the NIEIR unemployment rate slightly, to a level which was still well below national average. Similarly average hours worked per worker per week fell, but only to national average, and the proportion of the population of workforce age not in work increased, more or less to national average.

11.4 Household income

Across Australia, employment increased by 1.1 per cent in the year to 2017, which was not enough to maintain the jobs/population ratio. Wage rates stagnated and national average wage/salary income per capita declined by 2.7 per cent. As would be expected, given the end of the mining boom, the decline was particularly severe in Perth (nearly 5 per cent), though per-capita wages and salaries earned there are still above national average. The decline was less severe in Brisbane.

More surprising, average earned income declined in Adelaide by an estimated 4.6 per cent – perhaps an indication that the new jobs being generated in Adelaide are low-paid. Average earned incomes per capita were stationary in Sydney, but since average real wages fell in the rest of the country, this was sufficient to raise them to 16 per cent over national average. Melbourne was the only metropolitan area in which wage and salary incomes per capita increased, attaining a level just short of national average.

Mixed incomes per capita, the rewards of owner-operated business, rose by nearly 6 per cent Australia-wide, thanks largely to recovery in the rural sector. However, they also rose in all metropolitan areas other than Perth. Similarly, thanks to an increase in the profit share of the national income, property incomes increased in Australia generally, though the increase fell behind population growth in Perth.

Given the increase in unemployment, it would be expected that social security benefits per capita would have increased in 2017. However, benefits per capita fell in all the metropolitan areas and also in the non-metropolitan regions, with the smallest reduction in Perth. In various ways eligibility conditions have been tightened and some rates of payment have declined in real terms. Take-up of benefits directly related to unemployment (non-student youth allowance and Newstart), and also of age pension, is highest in Adelaide and lowest in Sydney, probably reflecting greater wealth in Sydney so that more potential applicants are ineligible due to the means test. Take-up of student allowances, however, is highest in Melbourne, followed by Adelaide, and lowest in Perth – young people who live in cities with relatively low wage rates are more likely to pursue education. Take-up of disability support and other payments which go largely to middle-aged citizens is highest in Adelaide and least in Perth, reflecting the age structure of the workforce in each city.

Household disposable income equals income from all sources (wages, mixed income, benefits and property income including the imputed income from home ownership) less direct taxes and interest liabilities. Tax rates were not greatly altered in 2016-17 and tax collections per capita accordingly followed regional income; they rose in Melbourne, were constant in Sydney and fell in the other three major metropolitan areas. Interest rates fell, so the proportion of income spent on interest payments likewise fell. This fall was smallest in Adelaide, where the mild revival in economic activity has doubtless occasioned additional household borrowing.

Putting these changes together, the preliminary estimates are that real household disposable income per capita rose in non-metropolitan Australia and fell in all the metropolitan areas except Melbourne. Thanks to the burst of rural prosperity, in non-metropolitan Australia it rose to roughly equal the national average. Despite recent falls, average household disposable income in Sydney is 12 per cent above national average, followed by Perth at 5 per cent above, Brisbane at 5 per cent below, Adelaide at 7 per cent below and Melbourne at 8 per cent below.

11.5 Household debt and assets

The sources of wealth include inheritances, savings and capital gains. Inheritances tend to go to middle aged sons and daughters, savings depend on income and hence also tend to accumulate with age, and capital gains are reserved for those who have invested in property or equities which, thanks to luck or good management, have risen in value.

As a result of these factors, Australians generally accumulate wealth as they age, though not necessarily at the same rate in each generation. Wealth accumulation across the life cycle is traditionally accompanied by a cycle of debt. People incur high debt when young and invest in education and home ownership; they repay their debts with savings from income and go on to accumulate assets which, enhanced by capital gains, will them yield adequate resources to support their retirement (at least according to the proponents of national superannuation). The effects of this life cycle can be observed in all the metropolitan cities; in all five households have, on average, incurred debts the servicing of which absorbs around 19 per cent of their income after tax (a little less in Adelaide, a little more in Perth, reflecting the age structure of the population of these cities). At current interest rates these debt-servicing commitments support average debt levels 1.7 times average household income after tax in Adelaide, 1.8 times in Sydney, 1.9 times in Brisbane and Melbourne and twice in Perth. Household debt levels, incurred in the pursuit of wealth, are thus fairly similar from city to city, but the pattern of capital gains has been guite different. The property assets of households in Sydney or Melbourne are, on average, 3.6 times their debts; for households in Brisbane or Adelaide the ratio is a little over twice and in Perth, where capital gains have lately been harder to come by, it is a mere 1.6 times debt.

11.6 Construction

In Australia as a whole, in the years following the global financial crisis of 2008 construction revived rapidly, thanks to the mining boom. Measured by construction expenditure per capita, it peaked in 2013. The peaks occurred differently in the several metropolitan areas.

In Sydney engineering construction (civil works and the like) peaked in 2013 and non-residential buildings peaked in 2015 but in 2017 residential construction (including renovations) reached its highest level in a decade, carrying the industry as a whole to peak activity in that year (and perhaps even carrying on into 2017-18).

The pattern in Melbourne was similar, with engineering construction peaking in 2011, though it has recently revived to near that peak level. Home renovations peaked in 2014 and building construction (both dwelling and non-dwelling) peaked in 2016. However, the fall from this peak was slow and compositional effects mean that the industry as a whole reached peak activity in 2017.

In Brisbane dwelling construction reached a peak in 2017, but engineering construction lagged, with a peak in 2014, and renovations and non-dwelling construction lagged even more, having peaked in 2009. Overall the industry was busiest in 2014, with activity per capita in 2017 running at 67 per cent of the 2014 peak.

Perth was seriously affected by the mining boom and its aftermath. Residential construction peaked in 2015, engineering construction peaked in 2012 and renovations and non-residential construction peaked in 2011, with the overall busiest year being 2012. Per capita construction activity in Perth in 2016-17 was at a mere 44 per cent of its 2012 peak.

Finally, in Adelaide dwelling construction peaked in 2016, engineering construction in 2013, renovations in 2012 and non-dwelling construction in 2011, with an overall peak in 2011. The flow of construction activity in Adelaide has been relatively constant and the level in 2017 was 85 per cent of the 2011 peak.

11.7 Conclusion

Sydney was founded as Australia's first city and has retained that title despite competition from Melbourne. Sydney's strengths lie in its finance sector and its knowledge economy, which generate high incomes. It picturesque harbour-side location is both a strength and a weakness; the strength obvious in every picture of the harbour bridge or the opera house, the weakness due to limited accessible land and high costs of commuter transport. However, the NSW government has addressed at least some of these costs over the past few years, and in the past year Sydney has grown more rapidly than Melbourne.

Melbourne is equally concerned to develop the knowledge economy and has adopted a similar strategy to Sydney, emphasising transport investment and inner suburban redevelopment. Melbourne's advantage of a relatively accessible urban fringe in which to build greenfield housing is not quite the competitive edge that it was a decade ago. Historically, Melbourne has depended on manufacturing exports and has not generated such high incomes as Sydney. Manufacturing industry in both cities shows signs of reviving after its mining-boom doldrums, but in Melbourne the revival has been hindered by the collapse of the motor vehicle industry.

Like Melbourne, Adelaide developed manufacturing industry in the 1950s and 1960s. It has a knowledge-economy core in which the finance sector is but lightly represented; hence relatively low incomes. Its recent growth has been steady rather than spectacular.

The two metropolitan cities affected by the onrush of the mining boom into their state hinterlands are now suffering from post-boom hangover – Perth more than Brisbane, since Perth had the more exhilarating boom. Both cities have gained, but both are undergoing adjustments, including increased unemployment as workers dribble back from construction projects in the mining-based regions.